BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

THE CANE GROWERS' QUARTERLY BULLETIN

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CONTENTS

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The

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Varietal Trials—1950 Season.

By W. R. STERN.

In this issue of the Bulletin we are presenting the results of eight varietal trials on Experiment Stations and seven varietal trials on growers' properties in the northern, central and southern sugar-growing districts. These trials represent part of the annual field programme of the Bureau and acknowledgment is here made of the co-operation given by growers in making available trial sites and assisting with planting and harvesting operations. Before finally discarding, or releasing a cane for general distribution, it is necessary that it be tested thoroughly under commercial conditions in order to assess its potential value to the industry. The observation of the growth habit of canes by individual growers is a valuable contribution to such a final assessment.

It is intended to extend the scope and range of these trials as increasing numbers of varieties become available for testing from the cane breeding section of the Bureau, and, in order to maintain this work at a high standard, more sites will be required. Growers can share in the responsibility of this work, which will ultimately prove beneficial to them, by co-operation with Bureau officers in the various districts in establishing and maintaining further such trials on suitable sites.

Conditions in the sugar belt during the last season were exceptionally wet and very often interfered with harvesting operations, but nevertheless most trials were harvested satisfactorily. The wet season extended well into April and conditions in May and June were generally fine. Out of season rains occurred in July and continued into August but clear weather—with intermediate wet periods—generally prevailed during September and October. Heavy rains resumed in November and continued until the end of December, causing local floodings in most cane-growing districts.

Excessive weed growth presented a problem particularly north of Townsville and in the Central districts. Arrowing was in general early and heavy in all districts this year and the behaviour of seedling canes in this regard during 1950 should be considered with some discrimination.

Though growing conditions cannot be regarded as abnormal, the 1950 season may be considered as better than average.

G. T. PRINGLE, Mossman.

Soil Type: Grey clay loam.

Nature of Crop: First ratoon.

Age of Crop: 10 months.

Harvested: August, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
Q.50	17·38	19·01	23·38	17·62	40·76	7·42
D.271	15·30	17·99	13·61	17·68	32·91	5·16
Comus	14·86	18·98	16·54	17·41	31·30	5·70
Trojan	12·69	..	13·38	18·74	26·07	..
Eros	10·48	18·11	19·21	18·20	29·69	5·40
D.225	9·75	18·84	15·29	16·93	25·04	4·43

DISCUSSION.

The variation within plots in the ratoon crop was less than in the plant crop, thus permitting the analysis of variance of the results. Q.50 exceeded Comus, D.225, D.271 and Trojan in tons of cane per acre at the 5 per cent. level of significance, and Eros exceeded only Trojan at the same level. Q.50 was the outstanding cane from the time that the trial was ratooned in October. Eros ratooned well but was somewhat sprawled while Trojan made rather slow growth. Comus and D.271 produced gappy stands but D.225 stooled quite well, gave an even stand and grew fairly rapidly. Eros and Q.50 had arrowed 100 per cent. at time of harvest. Any conclusions drawn from the results of this trial must be considered with some caution; however, the superiority of Q.50 cannot be doubted.

SUGAR EXPERIMENT STATION, MERINGA, BLOCK A. 3.

Soil Type: Brown clay loam.

Nature of Crop: First ratoon.

Age of Crop: 14 months.

Harvested: November, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
41 M.Q.779	44·29	17·81	34·54	18·99	78·83	14·45
F.304	37·23	16·19	27·48	17·39	64·71	10·82
F.335	34·50	16·74	23·12	16·57	57·62	9·60
Trojan	32·37	18·26	28·93	19·07	61·30	11·40
F.343	32·22	17·47	27·48	16·99	48·70	10·31

DISCUSSION.

In the ratoon crop 41 M.Q. 779 once again exceeded all varieties in yield and sugar per acre at the 5 per cent. level of significance, and all varieties except Trojan at the 1 per cent. level. F.343 was lodged at the time of harvest while F.304 showed damage by rats and was poor in cover. F.335 was also rat damaged and lacked ratoon vigour. Trojan did not perform as satisfactorily as usual. In the total analysis 41 M.Q. 779 produced 3.05 tons of sugar per acre more than Trojan—a creditable performance.

FOX AND CO., Gordonvale.

Soil Type: Red brown loam. **Nature of Crop:** First ratoon.

Age of Crop: 13 months. **Harvested:** August, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
Q.50	33·30	12·89	38·39	15·29	71·69	10·16
41 M.Q.779	32·63	12·76	30·56	16·55	63·19	9·22
Cato	27·40	16·03	29·26	16·79	56·66	9·30
D.221	26·84	17·41	27·12	17·06	53·96	9·30
D.271	24·19	17·87	28·89	16·61	53·08	9·12

DISCUSSION.

Q.50 maintained the superiority which it established in the plant crop. In the ratoons it was significantly better in yield than all other varieties at the 1 per cent. level, and in sugar per acre it was superior to Cato, D.271, D.221—also at the 1 per cent. level. From the time that the cane was ratooned in August, Q.50 was ahead of all the other varieties. It ratooned vigorously and produced an even stand. The plots of Cato also showed even stooling but not the same vigour as Q.50. Stands of 41 M.Q. 779 and D.221 and D.271 were uneven and gappy though vigorous. At harvest Q.50 was the only cane that had lodged. 41 M.Q. 779 had arrowed very little while D.221 had not arrowed at all.

G. H. EDWARDS, Proserpine.

Soil Type: Grey coarse sandy loam. **Nature of Crop:** First ratoon.

Age of Crop: 10 months. **Harvested:** June, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
Q.50	39·57	15·85	20·54	13·29	60·11	9·00
Pindar	34·79	16·73	16·36	14·72	51·15	8·21
P.O.J.2725	28·74	14·11	12·36	13·36	41·10	5·70
Eros	27·71	17·62	14·99	15·24	42·70	7·16
Comus	26·91	16·00	10·19	14·22	37·10	5·76
H.Q.426	24·10	16·78	5·56	13·73	29·66	4·81

DISCUSSION.

Due to the setbacks that this trial suffered in the ratoon crop there was a large variability in the results. In addition to a sandy strip through the middle of the experimental area, no ratooning fertilizer mixture had been applied. Further, cultivation in the vital stages of growth had been somewhat neglected and cows had eaten the tops of most of the Clark's Seedling. Nevertheless analysis of the results of the ratoon crop showed that Q.50 exceeded P.O.J.2725, Comus and Clark's Seedling in tons of cane per acre and sugar per acre at the 1 per cent. level of significance and Eros at the 5 per cent. level of significance. Though the superiority of Q.50 in this trial is undoubted, Pindar will prove a useful cane in this district. Eros performed fairly well despite its growth habit which is not regarded favourably by many growers.

E. C. HINCHEN, Lethebrook, via Proserpine.

Soil Type: Alluvial silt loam.

Nature of Crop: Plant.

Age of Crop: 17 months.

Harvested: October-November, 1951.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	c.c.s. in cane.	Sugar per acre.
	Tons.	Per cent.	Tons.
Trojan	53·57	15·77	8·82
Q.49	53·50	15·63	8·34
Pindar	50·31	16·45	8·28
Q.47	44·94	15·17	6·91
Q.45	44·00	15·72	6·81
Badila	28·00	15·11	4·26

DISCUSSION.

This land has previously grown excellent crops of P.O.J.2878, E.K.28 and Badila and this trial was set out to assess the value of newer varieties on this rich soil. Germinations were very good and even, ranging from 97 per cent. with Pindar to 90 per cent. with Q.49 and Q.47. Pindar, Q.49 and Q.45 made very good early growth and the stooling of all varieties was good. With the excellent growing conditions that prevailed, all cane was out of hand by the end of December, 1949. In May, 1950, Q.47 and Q.48 had commenced to flag. Badila suffered severely from grub damage and top rot, and this accounted for its very low yield. In the results Trojan and Q.49 exceeded Q.47, Q.45 and Badila in tons of cane per acre at the 5 per cent. level of significance, but in sugar per acre Trojan, Q.49 and Pindar performed significantly better than Q.45, Q.47 and Badila at the 5 per cent. level. In this trial all varieties performed significantly better in terms of tons of cane per acre and sugar per acre than Badila. The results of the ratoon crop will be awaited with interest, as from previous experience there is such a wide variation in the ratooning vigour and cropping of the canes under test.

SUGAR EXPERIMENT STATION, MACKAY. BLOCK A. 4.

Soil Type: Grey clay loam.

Nature of Crop: First ratoon.

Age of Crop: 10 months.

Harvested: August, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
Q.50	31·31	16·94	32·44	15·87	63·75	10·42
F.124	30·43	14·88	29·42	15·08	59·85	8·98
F.186	25·70	16·05	20·80	16·98	46·50	7·66
Q.28	24·40	14·62	24·70	15·00	49·10	7·29
F.184	22·57	14·70	18·29	16·05	40·86	6·27
F.160	21·86	16·70	22·86	14·95	54·72	7·07
F.135	17·90	17·04	25·58	17·12	43·48	7·43

DISCUSSION.

In the plant crop there was no significant difference in yield at the 5 per cent. level between Q.50, F.124, F.186 and Q.28. After harvest all canes came away well and made satisfactory progress. From the time that this block was ratooned in November, Q.50 and F.124 stood out as the leading canes. In the ratoon crop there was no significant difference between Q.50 and F.124 in tons cane per acre though Q.50 exceeded F.124 in sugar per acre. In August F.124 was erect and showed good cover, while F.135 had arrowed heavily and early; F.160 showed red rot. Both F.184 and F.186 showed variable stooling. As in the plant crop Q.28 did not perform very well and was equal only to F.135 and F.160 in yield per acre and to F.160 and F.186 in sugar per acre at the 5 per cent. level of significance.

SUGAR EXPERIMENT STATION, MACKAY. BLOCK A. 5.

Soil Type: Grey silty clay loam.

Nature of Crop: Plant cane.

Age of Crop: 12½ months.

Harvested: August, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	c.c.s. in cane.	Sugar per acre.
	Tons.	Per cent.	Tons.
G.105	35·74	16·27	5·82
Q.50	33·50	15·25	5·11
G.112	33·38	14·55	4·86
G.176	29·42	16·50	4·85
G.101	29·30	16·88	4·95
G.104	27·06	15·54	4·20
G.177	25·29	16·39	4·14

DISCUSSION.

Only two of the six seedling canes equalled Q.50 in performance. G.105, G.112 and Q.50 outyielded G.101, G.104, G.176, G.177 at the 5 per cent. level of significance, the necessary difference being 3.49 tons. All varieties germinated satisfactorily. Growth during the early stages was slow owing to dry weather, but with the onset of wet conditions growth improved. In May G.112 had arrowed while G.105 was lightly arrowing and only odd stools of Q.50 were flagging. On present indications it does not appear that any of these varieties will perform better than Q.50, although the performance of G.105 justifies consideration as a substitute variety under suitable conditions.

SUGAR EXPERIMENT STATION, MACKAY. BLOCK C. 3-6.

Soil Type: Grey silt loam.

Nature of crop: First ratoon.

Age of Crop: 12½ months.

Harvested: October, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
Q.50	25·67	15·88	37·58	16·76	63·25	10·38
Pindar	25·07	15·72	22·00	16·90	47·07	7·65
Co.301	22·92	15·28	40·20	14·89	63·12	9·49
Q.49	22·41	14·28	21·68	15·29	44·09	6·52
C.P.29/116	21·31	15·50	34·47	15·97	55·78	8·80
Q.47	20·16	15·37	26·49	15·59	46·65	7·03

DISCUSSION.

Q.50, C.P.29/116, Co.301 and Q.47 ratooned very well while Q.50 and C.P.29/116 and Co.301 showed excellent vigour and stooling and Q.47 good stooling. Co.301 performed exceptionally well in the ratoons bringing it well up in the total analysis. At time of harvest Q.50 and Co.301 exceeded C.P.29/116, Q.47, Pindar and Q.49 at the 5 per cent. level of significance while C.P.29/116 performed significantly better than Q.47, Pindar and Q.49. Pindar, which performed so well in the plant crop, only ranked with Q.49 in the ratoons. None of the varieties exceeded Q.50 in either yield of cane per acre or tons sugar per acre in the aggregate of the two crops. With the exception of Q.50 all varieties had arrowed and produced side-shoots.

SUGAR EXPERIMENT STATION, MACKAY. BLOCK D. 2.

Soil Type: Grey silt loam.

Nature of Crop: Plant cane.

Age of Crop: 14 months.

Harvested: October, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	c.c.s. in cane.	Sugar per acre.
	Tons.	Per cent.	Tons.
Q.50	40·90	16·83	6·88
B.174	37·76	17·49	6·60
E.119	37·70	15·25	5·75
E.129	34·83	16·24	5·65
E.135	28·70	15·58	4·44
Q.47	26·47	16·21	4·30

DISCUSSION.

At the 5 per cent. level of significance 4.29 tons per acre was the necessary difference to prove the superiority of one cane over another. The block was planted towards the end of August, 1949, and the canes made satisfactory progress throughout their period of growth. By October, 1950, there were only odd arrows in B.174 and Q.50, while Q.47, E.129 and E.119 had arrowed and were producing side shoots. E.135 which had arrowed and suckered fairly extensively showed red rot. Though the performance of B.174 was not better than Q.50 in this trial, it is being propagated for general distribution. At harvest it had 7-8 ft. cane, an average of 5-6 stalks per stool and showed good late cover. It should be more suited to the poorer lands of the Mackay district, and a useful cane for marginal lands.

E. C. THIELE, Barolin Road, Bundaberg.

Soil Type: Red sandy loam.

Nature of Crop: Plant cane.

Age of Crop: 14 months.

Harvested: November, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	c.c.s. in cane.	Sugar per acre.
	Tons.	Per cent.	Tons.
F.60	34·45	15·4	5·30
F.18	32·80	15·45	5·07
C.P.29/116	31·15	15·3	4·77
F.25	28·05	16·15	4·53
F.14	25·05	15·65	3·92

DISCUSSION.

Conditions at time of planting of this trial were rather dry but improved subsequently. The germination of all plots was satisfactory with F.60 and C.P.29/116 ahead of the others, and growth was good. F.60 yielded better than F.25 and F.14 at the 1 per cent. level of significance, while F.18 exceeded F.25 and F.14 at the 5 per cent. level. F.60 and F.18 performed favourably in comparison with C.P.29/116 both in tons of cane and tons of sugar per acre. F.60 made very good early growth and by November was ahead of all the other canes and maintained this lead until harvest. Heavy early arrowing was noted in F.14, F.18 and C.P.29/116 but F.25 arrowed later while F.60 had shown no signs of arrowing at the time of harvest. Though F.60 performed well in this particular trial, it is a cane that will require further intensive testing before it can be considered as a suitable commercial variety.

GIBSON & HOWES LTD., Bingera.

Soil Type: Red sandy clay loam.

Nature of Crop: First ratoon.

Age of Crop: 19½ months.

Harvested: August, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
Q.47	64·50	16·00	57·80	11·99	122·30	17·31
Q.49	52·95	15·20	59·65	11·82	112·60	15·12
Atlas	47·90	16·90	52·45	13·15	100·35	15·01
Trojan	54·60	17·05	40·75	13·98	95·35	14·99
P.O.J.2878	44·40	16·25	42·40	13·09	86·80	12·76

DISCUSSION.

The results of this trial are of exceptional interest. The plant crop was harvested in December, 1948, at the age of 16 months and the ratoon crop at the beginning of August, 1950, when 19½ months old. In the plant crop Q.47 exceeded all other varieties in yield per acre at the 1 per cent. level of significance, while in the ratoon crop both Q.49 and Q.47 exceeded Atlas, Trojan and P.O.J.2878 in terms of tons of cane per acre at the 5 per cent. level. Concerning the sugar per acre, Q.47 outyielded all other varieties at the 5 per cent. level of significance in the plant crop while in the ratoon crop Q.49, Q.47 and Atlas were superior to Trojan and P.O.J.2878. In the total analysis, however, Q.47 has definite superiority over all the other varieties in this trial both in tons of cane and tons of sugar per acre. P.O.J.2878 which has been the standard cane on Bingera plantation for many years gave significantly lower yields in plant and ratoon crops. It is interesting to note that in the ratoon crop Atlas gave good sugar early in the season.

The results indicate that on Bingera Plantation P.O.J.2878 has been superseded by other more suitable varieties for standover purposes, and these should be selected for their disease reactions and cost of cultivation.

The above figures are by courtesy of the management of Gibson and Howes, Ltd.

KENDALL BROS., Branyan Road, Bundaberg.

Soil Type: Red sandy loam. **Nature of Crop:** Second ratoon.

Age of Crop: 11 months. **Harvested:** September-October, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon Crop.		Second Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
C.P.29/116 ..	30·12	16·47	18·12	15·90	19·14	14·9	67·38	10·69
Q.28	29·03	16·08	17·01	15·10	19·98	13·45	66·02	9·93
Q.47	27·26	16·45	14·30	15·60	16·93	14·9	58·49	9·23
M.1900 ..	19·87	17·37	11·91	16·30	10·03	14·95	41·81	6·89

DISCUSSION.

There can remain no doubt of the superiority of the three newer canes over the old standard M.1900 Seedling. The three varieties gave significantly better yields of cane and sugar per acre at the 1 per cent. level than did M.1900. It is interesting to note that in the 2nd ratoons Q.28 yielded significantly better than Q.47 at the 5 per cent. level. In spite of this, it is advisable not to place the variety on the approved list until more is known about the etiology and control of ratoon stunting disease, to which this cane is so susceptible.

SUGAR EXPERIMENT STATION, BUNDABERG. BLOCK A. 2.

Soil Type: Red volcanic. **Nature of Crop:** First ratoon.

Age of Crop: 13 months. **Harvested:** September, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
F.18	29·60	12·70	49·76	12·20	79·36	9·80
F.16	20·30	12·75	47·16	13·52	76·46	10·08
F.31	28·30	11·95	47·46	12·78	75·76	9·44
F.35	27·39	14·20	49·86	12·86	77·25	10·30
F.27	26·89	13·90	45·95	13·42	72·84	9·91
Q.49	24·98	13·50	48·66	12·77	73·64	9·58
F.49	24·38	14·30	47·46	13·74	71·84	9·99
F.14	24·18	13·50	42·84	13·68	67·02	9·12
F.25	23·98	14·70	47·66	13·63	71·64	10·00
F.33	22·78	13·10	44·15	13·87	66·93	9·10
F.60	22·68	16·30	48·26	11·55	70·94	9·04

DISCUSSION.

All canes ratooned well and made satisfactory progress during their 13 months of growth. In April, 1950, F.18, F.28 and F.49 looked better than the standard and a few months later F.35 was also worthy of comparison. At time of harvest F.60 had neither flagged nor arrowed. The statistical analysis of yield and sugar per acre showed, as was predicted last year, that with the possible exception of F.18 and F.60, neither cropping capacity nor agronomic features warrant the inclusion of these varieties in further trials.

SUGAR EXPERIMENT STATION, BUNDABERG. BLOCK B. 1.

Soil Type: Red volcanic. **Nature of Crop:** Plant.

Age of Crop: 14 months. **Harvested:** November, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	c.c.s. in cane.	Sugar per acre.
	Tons.	Per cent.	Tons.
H.3	51·38	15·11	7·78
H.52	50·30	15·15	7·60
H.1	48·89	16·34	8·07
H.18	45·54	15·40	7·03
H.24	45·38	14·60	6·62
F.55	44·75	15·95	7·14
H.47	41·70	15·50	6·46
H.83	41·12	14·78	6·07
H.17	35·63	13·86	4·94
F.30	34·27	14·98	5·13
Q.47	33·31	14·29	4·76

DISCUSSION.

With the exception of Q.47, H.24 and F.55 all germinations were above 90 per cent. with H.3, H.1 and H.47 giving best results. It was noted, however, that on the whole, germinations were slow. Growth of the varieties was only fair and by August all varieties except H.24 and H.52 had arrowed; H.24 showed good late growth, F.55 suffered considerable death from top rot, while F.30 showed red rot. H.52, H.18 and H.47 were the only canes to show any desirable attributes. However, the results from the ratoons may radically change the picture of present superiority of seedling canes.

SUGAR EXPERIMENT STATION, BUNDABERG. BLOCK B. 3.

Soil Type: Red volcanic loam. **Nature of Crop:** First ratoon.

Age of Crop: 13½ months. **Harvested:** September, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Plant Crop.		First Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
C.P.29/116	31·70	11·2	45·72	14·52	77·42	10·19
Q.47	30·33	15·5	40·12	14·95	70·45	10·69
Q.49	25·66	14·2	37·03	14·25	62·69	8·92
Pindar	21·29	17·0	35·41	16·12	56·70	9·33

DISCUSSION.

In the ratoon crop C.P.29/116 yielded better than Q.47, Q.49 and Pindar in tons of cane per acre and sugar per acre, at the 1 per cent. level of significance. Q.47 exceeded Q.49 and Pindar in tons of cane per acre, while Q.47 and Pindar gave better sugar per acre than Q.49 (also at the 1 per cent. level). Ratooning was good in all varieties and all canes made satisfactory growth. C.P.29/116 performed better than all the other varieties from the time that the trial was ratooned. At harvest Pindar was the only cane that had not arrowed. In the total analysis the sugar per acre of Q.47 is somewhat better than that of C.P.29/116 despite its lower cane tonnage, rendering it a valuable cane under suitable conditions in south Queensland. Pindar should be more suited to the alluvial soils than to the red volcanic loams.

W. TRUSCOTT, Barolin Road, Bundaberg.

Soil Type: Red sandy loam.
Age of Crop: 14 months.
Nature of Crop: First ratoon.
Harvested: January, 1951.

SUMMARY OF CROP YIELD.

Variety.	Plant Crop.		First Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
C.P.29/116	34·93	16·5	46·20	14·85	81·13	12·62
B.50	33·12	16·2	40·95	15·3	74·07	11·63
D.73	30·85	15·5	38·50	15·4	69·35	10·71
D.9	26·12	16·7	25·00	13·85	51·12	8·17
D.62	26·08	16·6	28·20	13·6	54·28	7·82

DISCUSSION.

The results of the ratoon crop are very similar to those of the plant crop, C.P.29/116 exceeding all other varieties in yield of tons of cane and sugar per acre at the 5 per cent. level of significance. Both C.P.29/116 and B.50 ratooned vigorously and maintained their lead up to the time of harvest. D.9 was very backward throughout the growing period, while D.62 was badly affected by red rot. As none of these seedlings even compared with C.P.29/116 in either performance or agronomic characters, there will be no further trials with them.

M. B. GOODLIFFE, North Isis.

Soil Type: Red volcanic loam.
Age of Crop: 14 months.
Nature of Crop: Plant cane.
Harvested: October, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	c.c.s. in cane.	Sugar per acre.
	Tons.	Per cent.	Tons.
Q.51	53·01	14·85	7·87
Q.50	51·18	15·3	7·83
C.P.29/116	42·22	13·8	5·83
Pindar	39·78	17·0	6·76
Q.47	38·97	14·7	5·73

DISCUSSION.

The results of this trial should be of wide interest, particularly amongst growers in the Childers district, for the site was eminently suited to a trial of this nature. C.P.29/116 germinated best (98 per cent.) followed by Q.50 and Pindar (97 per cent.). Q.51 and Q.47 gave germination figures of 81 per cent. and 79 per cent. respectively. However, Q.50 and C.P.29/116 were the first to germinate (in that order) while Pindar was slow and Q.47 and Q.51 were very slow. Missing plants in Q.47 and Q.51 were replaced by supplies. Good even

growth was maintained by all varieties until harvest except Q.47 and C.P.29/116, which had arrowed in June. No arrows were observed in Q.50, Q.51 or Pindar and all canes remained erect. Q.51 and Q.50 yielded better in terms of cane and sugar per acre than did C.P.29/116, Pindar and Q.47 at the 1 per cent. level of significance. C.P.29/116 yielded significantly better than Q.47 at the 5 per cent. level, but it was interesting to note that Pindar gave significantly better sugar per acre than C.P.29/116 and Q.47. Q.50 has more desirable agronomic features than Q.51 and it should therefore be the more valuable cane.

N. H. WELLARD, Nambour.

Soil Type: Grey silty loam.

Nature of Crop: Plant cane.

Age of Crop: 12 months.

Harvested: September, 1950.

SUMMARY OF CROP YIELDS.

Variety.	Cane per acre.	c.c.s. in cane.	Sugar per acre.
	Tons.	Per cent.	Tons.
Q.50	36·71	15·03	5·52
Pindar	32·82	15·57	5·11
N.Co.310	31·53	15·88	5·00
Q.47	29·94	14·51	4·42
C.P.34/79	28·87	15·33	4·34

DISCUSSION.

In all, this trial was flooded five times between September, 1949, and July, 1950. It was planted in mid-September and germinations ranged as follows: C.P.34/79—79 per cent.; Q.50 and Pindar—70 per cent.; N. Co.310—68 per cent.; Q.47—55 per cent. Nevertheless the canes made good growth with Q.50, Pindar and N. Co.310 performing most satisfactorily. Q.47 also grew well but poor germination influenced the yield. C.P.34/79 gave poor cover and despite the vigorous stooling did not yield particularly well. Q.50 significantly outyielded all other varieties at the 5 per cent. level, while Pindar exceeded C.P.34/79 (also at the 5 per cent. level). Q.50 and Pindar both exceeded Q.47 and C.P.34/79 in sugar per acre at the 5 per cent. level of significance, but only Q.50 exceeded Q.47 and C.P.34/79 at the 1 per cent. level. Monthly maturity samples showed that N. Co.310 and Pindar had a tendency to mature in August and these canes may prove suitable for early harvest on these wet soils. In June N. Co.310 and Pindar gave better c.c.s. readings than did Q.50 and Q.47.

Fig. 62.—Part of M. B. Goodliffe's trial. Q.50 is on the right and Q.47 on the left.

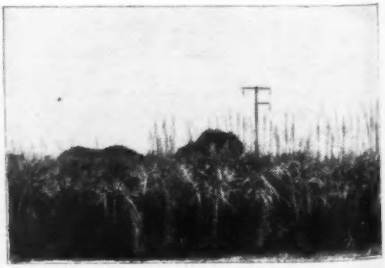

Fig. 63.—The same trial showing Pindar on the left and Q.47 on the right.

TRASH CONSERVATION TRIAL.

This trial was inaugurated in 1933—at a time when the burning of cane was coming into vogue—in order to determine whether trash conservation had any appreciable influence on cane yields. The block was divided into adjacent plots of approximately one third of an acre each. Trash was conserved on the two inside plots while on the two outside plots all crop residues were burnt. This trial has been maintained continuously through five cycles, and the results of the last cycle are set out hereunder.

PERMANENT TRASH TRIAL.

SUGAR EXPERIMENT STATION, BUNDABERG. BLOCK E. 3 A.

SUMMARY OF CROP YIELDS.

Treatment.	Plant Crop.		First Ratoon Crop.		Second Ratoon Crop.		Summary.	
	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Cane per acre.	c.c.s. in cane.	Total cane per acre.	Total sugar per acre.
	Tons.	Per cent.	Tons.	Per cent.	Tons.	Per cent.	Tons.	Tons.
Trash	42·1	15·41	30·74	13·50	37·35	12·15	110·19	15·18
No trash ..	44·9	15·33	29·70	13·75	37·11	12·05	111·71	15·44

DISCUSSION.

This completes the fifth rotation of the permanent trash trial which was established in 1933. The aggregate tonnage of cane harvested to date is:—Trash Plots 347.9 tons of cane and No Trash Plots 346.9 tons of cane; the sugar per acre produced is respectively 50.48 and 50.36 tons. A complete record of the individual crops is given below.

Year of Harvest.	Variety and Class.	Trash Plots.		No Trash Plots.	
		Cane per acre.	Sugar per acre.	Cane per acre.	Sugar per acre.
		Tons.	Tons.	Tons.	Tons.
1934	Q.813 Pl.	36·2	5·83	36·2	5·68
1935	Q.813 1st R.	9·4	1·24	13·1	1·69
1937	P.O.J.2725 Pl...	19·1	3·11	18·6	3·11
1938	P.O.J.2725 1st R.	39·5	5·53	34·7	5·03
1939	P.O.J.2725 2nd R.	30·9	4·85	29·0	4·41
1941	P.O.J.2878 Pl...	44·0	6·42	43·9	6·25
1943	P.O.J.2878 S/O 1st R.	42·9	6·48	43·6	6·67
1946	P.O.J.2878 S/O A.P.	15·7	1·95	17·1	2·09
1948	Q.49 Pl.	42·1	6·38	44·9	6·88
1949	Q.49 1st R.	30·7	4·15	29·7	4·08
1950	Q.49 2nd R.	37·4	4·54	37·1	4·47

VELVET BEAN VARIETIES.

Towards the end of 1948, four velvet bean varieties were received from the C.S.I.R.O. Plant Introduction Section. These were:—

C.P.I. 2041.—*Mucuna pachylobia* White stringless velvet bean.

C.P.I. 2043.—*Mucuna sp.* "Somerset Velvet Bean."

C.P.I. 2271.—*Mucuna aterrima* Mauritius bean.

C.P.I. 2272.—*Mucuna deeringiana* Florida velvet bean.

The varieties were planted out in propagation plots on the Experiment Station at Bundaberg late in December, 1948, and sufficient seed was obtained from these plots to plant out a replicated trial, with eight varieties, in December, 1949.

A severe infestation of cutworms necessitated harvesting the trial earlier than was intended and the plots were cut in mid-April, 1950. At harvest all varieties except C.P.I. 2271 were at the very early pod-forming stage while C.P.I. 2271 had commenced to flower.

The results of this trial are set out hereunder and the discussion follows.

SUGAR EXPERIMENT STATION, BUNDABERG. BLOCK D. 2.
LEGUME TRIAL WITH VELVET BEAN VARIETIES.

Variety.	Green Material per acre.
	Tons.
C.P.I.2041	9·45
C.P.I.2043	10·80
C.P.I.2271	12·28
C.P.I.2272	12·02
Black Mauritius	11·20
Jubilack	11·74
Marbilee	11·07
Somerset	11·31

DISCUSSION.

In several previous trials with velvet bean varieties, Somerset, Marbilee and Jubilack gave best results in all the principal cane growing centres. These varieties were commercialised and have become so popular that seed demand far exceeds supply. In the above trial they were tested against several more recent introductions but although two of these gave slightly higher tonnages the differences were not significant and it is not intended to propagate them in commercial quantities.

Soil Fertility Investigations.

RESULTS OF THE 1950 SEASON.

By L. G. VALLANCE.

It cannot be too clearly emphasised that the manner in which a farmer handles his soils is of extreme importance. There is much more in the art of soil management than tearing it to pieces with a high-powered tractor at frequent intervals. It goes without saying that the successful establishment of a good crop is hard work but the farmer who replaces some of this hard work with hard thinking is the one who has less often to tell hard luck stories to explain his lack of success. A matter which is causing some concern to those who are given the opportunity to gain an overall picture of what is happening in the sugar industry is the present day trend towards indiscriminate use of fertilizer. It seems a strange fact that the more costly this material becomes the more haphazardly it is used. Possibly this state of affairs is an aftermath of the years of extreme shortage during the war and immediate post-war period with the subsequent tendency to purchase whatever type and quantity was available as supplies began to approach normaley. If such is the case it is to be hoped that it is a passing phase.

During the year the determination of the fertilizer requirement of many soils was carried out both by means of laboratory analysis and the setting out of fertilizer trials. Recommendations were forwarded to all growers whose soils were tested in the laboratory, giving details of the most suitable type and amount of fertilizer mixtures and also whether or not an application of lime was required. As a matter of interest the summarised figures indicating the phosphate and potash content of the soils examined are given in Table I. As has been previously stated (Cane Growers' Quarterly Bulletin, April, 1950) these figures again suggest that potash deficiency is becoming more pronounced than that of phosphate. This point is of importance to those growers who have used only high phosphate fertilizers for many years. They should not overlook the possibility that the plant food status of their soils may have altered with years of continued cultivation. A soil analysis is a quick and efficient method of determining the present fertilizer requirement of any particular field.

Growers are once more reminded that soils samples are analysed free of charge. Arrangements may be made for this to be done by the farmer taking the soil samples himself and forwarding them to this office (see Procedure for Taking Soil Samples on page 147 of this Bulletin) or by getting in touch with the local Bureau officer stationed in his district.

TABLE I.

Soil Fertility Trend in Various Cane Areas Showing Percentage of Soil Samples at each Fertility Level.

District.	Phosphate.			Potash.			Number Samples.
	Low.	Fair.	Good.	Low.	Fair.	Good.	
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	
Babinda-Mossman ..	33	11	56	33	22	45	54
Innisfail	29	22	49	52	26	22	100
Ayr..	..	..	100	..	20	80	5
Mackay	52	22	26	56	22	22	23
Bundaberg	31	14	55	51	22	27	78
Southern	31	20	49	33	28	39	75
	31	18	51	45	24	31	335

FERTILIZER TRIALS.

MESSRS. S. AND P. LEONARDI'S FARM, MOSSMAN.

Soil Type—Old clay alluvial.
Age of Crop—11 months.
Nature of Crop—First ratoon.
Harvested—September, 1950.

This trial, the plant crop results of which were reported last year, was continued on the first ratoons of Comus. Fertilizer was used at the same rate per acre as for the plant cane as follows:—

1. Sulphate of ammonia—nil.
2. Sulphate of ammonia—200 lb. per acre.
3. Sulphate of ammonia—400 lb. per acre.
4. Superphosphate—nil.
5. Superphosphate—200 lb. per acre.
6. Superphosphate—400 lb. per acre.
7. Muriate of potash—nil.
8. Muriate of potash—120 lb. per acre.
9. Muriate of potash—240 lb. per acre.

It may be recalled that when the plant crop of this trial was harvested there was a good response to potash while the application of sulphate of ammonia and superphosphate did not bring about an increase in yield. However the greater need for nitrogen which is generally the case in ratoons was indicated by the large increases due to the application of this fertilizer to the first ratoons. Actually it was found that 200 lb. of sulphate of ammonia was responsible for an increase of .38 tons of sugar per acre while the 400 lb. dressing brought about an increase of .67 tons sugar per acre. It should be mentioned, however, that this benefit did not occur unless adequate potash was applied at the same time. The response to potash was very marked and was approximately of the same order as the beneficial effect of sulphate of ammonia.

These results bear out our oft-repeated statement that nitrogen and potash are very closely linked as far as the production of sugar per acre is concerned and that it is of little use having a sufficiency of one of these materials without having an adequate supply of the other.

As in the plant crop there was again no response to superphosphate.

MR. S. PAGANO'S FARM, MORESBY.

Soil Type—Red schist.
Age of Crop—11 months.
Nature of Crop—First ratoon.
Harvested—July, 1950.

The fertilizer treatments applied to this trial were similar to those applied to the plant crop last year, i.e.—

1. Sulphate of ammonia—nil.
2. Sulphate of ammonia—210 lb. per acre.
3. Sulphate of ammonia—420 lb. per acre.
4. Superphosphate—nil.
5. Superphosphate—210 lb. per acre.
6. Superphosphate—420 lb. per acre.
7. Muriate of potash—nil.
8. Muriate of potash—150 lb. per acre.
9. Muriate of potash—300 lb. per acre.

As in the case of the plant crop, sulphate of ammonia again brought about a marked increase in yield. The lighter dressing (210 lb. per acre) being responsible for an increase of .87 tons of sugar per acre while the heavier dressing caused an increase of 1.02 tons sugar per acre.

Apparently the plant crop had depleted the soil of potash since although no response was obtained in the plant cane the application of this fertilizer brought

about a substantial increase in the first ratoons. However, the lighter dressing of 210 lb. gave results as good as the heavier application.

Although there was an excellent response to superphosphate in the plant crop the application of this material failed to produce any result in the first ratoon. This was surprising and somewhat difficult to explain.

MR. R. T. STANILAND'S FARM, GLENISLA. PROSERPINE.

Soil Type—Alluvial sandy loam.
Age of Crop—9 months.
Nature of Crop—First ratoon.
Harvested—July, 1950.

The fertilizer treatments which were similar to those of the plant crop were as follows:—

1. Sulphate of ammonia—nil.
2. Sulphate of ammonia—200 lb. per acre.
3. Sulphate of ammonia—400 lb. per acre.
4. Superphosphate—nil.
5. Superphosphate—200 lb. per acre.
6. Superphosphate—400 lb. per acre.
7. Muriate of potash—nil.
8. Muriate of potash—120 lb. per acre.
9. Muriate of potash—240 lb. per acre.

Again there was a marked response to sulphate of ammonia. The heavier dressing increased the yield by 1.24 tons of sugar per acre while the 200 lb. application was responsible for an increase of .84 tons sugar per acre. This was even greater than the responses obtained in the plant crop last year.

However, in this ratoon crop the response to potash was practically nil and this fact contrasted greatly with the good response which was so noticeable in the plant crop. Apparently the soil contained sufficient available potash to support the ratoon crop which was cut at nine months and was only about half as big as the heavy tonnage obtained from the plant cane.

The response to superphosphate was somewhat variable and as this state of affairs was also noted in the plant crop it appears likely that the soil requires only sufficient phosphate to maintain its present good level of fertility in this respect. However, the trial will be ratooned and until the results of the complete cycle are obtained it would not be wise to draw any definite conclusions as to phosphate requirement.

MESSRS. W. BIGGS & SON, FOXDALE. PROSERPINE.

Soil Type—Forest sandy loam.
Age of Crop—14 months.
Nature of Crop—Plant cane.
Harvested—October, 1950.

The fertilizer treatments used in this trial were the same as those already quoted for the experiment on Mr. Staniland's farm in the same district.

Outstanding results were obtained from the use of sulphate of ammonia. The yields in tons of sugar per acre as a result of the various sulphate of ammonia applications are as follows:—

Sulphate of Ammonia lb. per Acre.	Yield of Sugar Tons per Acre.
Nil	3·95
200	5·73
400	6·53

The above figures indicate that the 200 lb. per acre application increased yields by 1.78 tons of sugar per acre

while the heavier dressing (400 lb.) brought about an increase of 2.58 tons sugar per acre.

An excellent response was also obtained due to the use of muriate of potash. An application of 120 lb. of this fertilizer was responsible for an increase of .77 tons of sugar per acre. Apparently this amount was sufficient to supply the requirement of the crop since there was no additional response to a further dressing of 120 lb. per acre of this material.

The application of superphosphate did not have any beneficial effect on crop yields and it will be interesting to observe the effects of this material on the subsequent ratoons.

MESSRS. A. E. KELLY & SONS' FARM, NORTH ISIS.

Soil Type—Red volcanic.
Age of Crop—20 months.
Nature of Crop—Plant cane.
Harvested—August, 1950.

For the first time for several years it was possible to set out a fertilizer trial in the Isis district. The various treatments used were as follows:—

1. Sulphate of ammonia—nil.
2. Sulphate of ammonia—160 lb. per acre.
3. Sulphate of ammonia—320 lb. per acre.
4. Superphosphate—nil.
5. Superphosphate—200 lb. per acre.
6. Superphosphate—400 lb. per acre.
7. Muriate of potash—nil.
8. Muriate of potash—180 lb. per acre.
9. Muriate of potash—360 lb. per acre.

An excellent response to sulphate of ammonia was obtained. It was found that the 160 lb. and 320 lb. dressings increased the yield of sugar by .39 and .64 tons of sugar per acre respectively.

Although this soil type usually responds to potash applications the yields of the plots receiving different amounts of potash varied somewhat and no definite conclusions could be drawn. However, further information may be gained from the ratoons.

Superphosphate did not produce any beneficial results.

MR. T. CAVE'S FARM, MAROOCHY RIVER.

Soil Type—Brown alluvial loam.
Age of Crop—12 months.
Nature of Crop—Second ratoons.
Harvested—October, 1950.

With the harvest of the second ratoon crop this trial has now completed its cycle. The outstanding feature has been the response to sulphate of ammonia. The yields of the plots which received an annual application of 200 lb. or 400 lb. per acre of this fertilizer are compared below with those of the plots which received no sulphate of ammonia over the three crops.

Amount of Sulphate of Ammonia applied to each Crop.	Tons Cane per Acre.				
	Plant.	First Ratoon.	Second Ratoon.	Total Yield.	Increase.
Nil	36·94	30·75	26·14	93·83	..
200 lb. per acre	40·36	35·67	30·81	106·84	13·01
400 lb. per acre	43·75	39·72	35·19	118·66	24·83

From a survey of these figures it is evident that the three applications of the lighter dressing of sulphate of ammonia increased the total yields over the three crops by 13.01 tons of cane per acre. The heavier dressing was responsible for an increase of 24.83 tons of cane per acre.

The results of the superphosphate and muriate of potash applications were interesting. In none of the three crops was there a definite response to either of these two fertilizers, but there were strong indications that had the growth of the cane on the various plots been a little less uneven significant responses would have been obtained. It would certainly be unwise to omit phosphate and potash from the fertilizer programme under these circumstances, and to conclude that sulphate of ammonia alone is required would be entirely erroneous.

MR. J. R. PETERSON'S FARM, ROSEMOUNT ROAD, NAMBOUR.

Soil Type—Brown clay loam.

Age of Crop—15 months.

Nature of Crop—Plant cane.

Harvested—December, 1950.

The various fertilizer treatments applied to the trial were as follows:—

1. Sulphate of ammonia—nil.
2. Sulphate of ammonia—200 lb. per acre.
3. Sulphate of ammonia—400 lb. per acre.
4. Superphosphate—nil.
5. Superphosphate—200 lb. per acre.
6. Superphosphate—400 lb. per acre.
7. Muriate of potash—nil.
8. Muriate of potash—144 lb. per acre.
9. Muriate of potash—288 lb. per acre.

This trial was unfortunately subjected to very wet conditions and about a month after planting was actually submerged for a period of 48 hours. In the early stages the plots receiving sulphate of ammonia showed superior growth, but before harvesting heavy rain and local flooding caused the cane to sprawl and the previous differences in growth became less apparent.

When the trial was harvested the figures indicated that the heavier dressing of nitrogen had increased the yield by 5.17 tons of cane. No significant difference due to the lighter dressing could be detected.

The superphosphate and muriate of potash applications did not appear to have any beneficial response. However, due to the climatic vagaries the trial was conducted under extremely difficult conditions and it is to be hoped that more definite results will be obtained in the ratoon crop.

ROCK PHOSPHATE TRIALS.

In order to investigate the possibility of using finely ground raw rock phosphate instead of the more expensive superphosphate, a series of trials were put down in the Babinda-Tully area. It was considered that rock phosphate might become available to the cane plant if applied as fertilizer on some of the more highly acid soils which occur in these wet districts. The treatments applied were as follows:—

(1) Sugar Bureau Mixture No. 2 at the rate of 4 cwt. per acre. This mixture contains 14.75 per cent. phosphoric acid all of which is present in the form of superphosphate.

(2) Special Mixture "A" with a similar fertilizer content to the above, except that the phosphoric acid was present as rock phosphate and not superphosphate.

(3) Special Mixture "B" which was the same as "A" except that it contained twice the amount of rock phosphate. This extra quantity was added in order to determine whether sufficient of this slowly available fertilizer could be added at planting in order to fulfil the requirements of the plant, first and second ratoon crops.

(4) A mixture containing the same amounts of nitrogen and potash as the above three mixtures but in which no phosphoric acid of any kind was present.

The above mixtures and rate of application per acre were so adjusted that each treatment received the same amount of nitrogen and potash per acre.

The sites selected for the trial were on acid alluvial soils which normally respond to phosphate on the following properties:—Mr. W. A. Wilkin's farm, Babinda; Mr. L. Vipiani's farm, Euramo; Mr. G. Ottone's farm, Lower Tully; and Mr. T. Maifredi's farm, Euramo. When the plant crops of the first three trials were harvested it was found that the yields of the plots receiving no phosphate at all were equally as good as those which had received the various forms of phosphatic fertilizer. Although this was somewhat unfortunate it was not altogether unexpected since cane growing on soils which have been adequately fertilized for previous crops very often shows little or no response to fertilizer in the plant crop. .

However, the last-mentioned trial showed a definite response to phosphate and thereby provided useful information regarding the availability of the raw rock phosphate. The summarised results are as follows:—

Treatment.	Tons per Acre.	
	Cane.	Sugar.
1. Sugar Bureau Mixture No. 2	25·79	4·57
2. Special Mixture "B" (double rock phosphate)	22·69	3·73
3. Special Mixture "A" (single rock phosphate)	20·59	3·33
4. No phosphate ..	19·29	3·33

The yields from the plots fertilized with Sugar Bureau No. 2 were very significantly better than those which received either no phosphate or phosphate in the form of raw rock. The actual increase over Treatments 3 and 4 was 1.24 tons of sugar per acre.

The double rock phosphate dressing gave slightly better results than the single rock phosphate and the no phosphate applications. However, the differences over the various plots were not sufficiently uniform to allow a definite conclusion that the double dressing was significantly superior.

The conclusion to be drawn from this trial to date is that finely ground rock phosphate when applied at planting will not replace superphosphate on this soil type. Whether, with the lapse of time, the rock phosphate will become sufficiently available to supply the requirements of the ratoon crops remains to be seen, and the ratoons of these trials will be watched with a great deal of interest.

MINOR ELEMENT TRIALS.

It is well known that, in addition to the normal plant foods, it is essential that elements such as copper, zinc, etc., must be present in the soil in order to obtain the maximum growth of the cane plant. Over the past decade the Bureau has adopted the practice of including in the field experimental programme a few trials to determine whether, with continued cultivation to cane, some of our soils are becoming depleted in these important elements. A considerable number of trials have now been conducted and it would appear that, in general, no such deficiencies have yet developed in most sugar areas. Exceptions occur in certain parts of the Mackay and Maroochy districts where the disease known as "Droopy Top" is prevalent in small localised areas.

During the year a minor element trial was harvested in the Mourilyan area. The soil was light coloured and very sandy in nature. Although no deficiency symptoms had been observed in the previous crops it was thought possible that a response might be obtained on this highly leached sand. The elements used were as follows:—Copper, zinc, manganese, boron, cobalt and molybdenum. However, when the yields of the various plots were weighed and compared with the untreated plots it was quite evident that no benefit had been obtained from the different treatments.

Procedure for Taking Soil Samples.

Owing to differences in the fertility gradients of soil in different parts of a field, it is sometimes a difficult matter to obtain a sample which will truly represent the block of land under investigation and single samples taken at random are practically worthless. A number of subsamples from different parts of the field under examination must therefore be taken and approximately equal weights of each mixed thoroughly to form the final sample. The number of subsamples which should be taken and mixed to obtain such a representative sample will depend on the apparent variability of the soil but at least three samples should be taken and composited for the smallest area. For areas of 5 to 10 acres at least two samples per acre should be taken and composited.

One of the most convenient implements with which to sample the soil is a post hole digger, as this removes a complete portion in one operation. An ordinary 1½ inch auger is good, provided the soil is sufficiently moist to cling to it firmly. If these implements are not available, a square hole should be dug to a depth of 10 inches, and after cleaning out the loose earth, a slice about 2 inches to 3 inches thick taken down one side of the hole from top to bottom. Such a sub-sample should then be placed on a bag or piece of canvas. Other subsamples (of approximately similar weights) should be taken and added to the first one on the canvas and all mixed thoroughly before taking the final sample, which should approximate two pounds.

Soils which appear markedly different must never be mixed, but each sampled for separate analysis. To obtain the most useful information from the analysis of the soil, it is necessary to take the sample just before or just after a cane crop is harvested and before the fertilizer is applied to the next crop. Samples should be taken from the space between the rows where there is less likelihood of contamination occurring from a previous application of fertilizer. Fallow blocks should not be sampled since the results do not always give a true indication of the immediate fertilizer requirement.

Samples should be forwarded to the Director, Bureau of Sugar Experiment Stations, Department of Agriculture and Stock, William Street, Brisbane, and should be carefully marked. A letter should accompany all samples supplying information and details regarding the following:—

Farmer's name and address;

Drainage (good, bad, &c.);

Surface soil (sandy, red volcanic, &c.);

Subsoil (heavy clay, sandy, &c.);

Class of crop now on field (Q.50 plant, &c.);

Is green manuring practised?;

Usual fertilizer treatment;

Has soil been limed?;

Reasons why analysis is required.

L.G.V.

Disposal of Crop Residues.

By H. G. KNUST

With almost universal pre-harvest burning of cane in Queensland, growers are faced with the problem of disposal of crop residues which are particularly heavy in years of wet harvesting conditions and in crops which normally carry a heavy top.

Common practices employed consist of (1) burning the residues *in situ* and (2) raking into irregular rows, either across or parallel with the cane rows

Fig. 64.—The rear-delivery rake.

with a rear-delivery hay rake (Fig. 64). The first method usually results in partial burning of the residues and the litter remaining causes clogging of tined implements during subsequent cultivation operations. The second method has its disadvantages in that crop residues are not usually entirely lifted by it, and most operators often do not take the trouble to make continuous rows of residue across or with the drills, thereby increasing the cost of burning as each bundle has to be lighted separately (Fig. 65). Alternatively the accumulated residues have to be moved by hand if it is intended to conserve them between the rows of cane.

It is proposed to discuss the merits of the side-delivery rake for disposing of crop residues. During 1933 the Bureau obtained a side-delivery rake (Fig. 66) for trial and experimental purposes in trash conservation work. Excellent work was done on the trash from crops ranging from 10 to 30 tons per acre and trash from 3 rows of a 40-ton crop was successfully rolled into one interspace.

In the field shown in Fig. 67 it will be noted that an appreciable amount of crop residue remains on the field; burning *in situ* here or raking with a rear-delivery rake would be tedious and unsatisfactory. These crop residues were easily handled with the side-delivery rake when, as shown in Fig. 68, residues from eight rows were deposited in one interspace and no further tucking in was needed to remove the residues from the top of the stools. Disposal of crop residues with a side-delivery rake is relatively simple but the raking should be done in the direction of the cane rows

Fig. 65.—Illustrating irregular bundling of crop residues.

Fig. 66.—The side-delivery rake.

Fig. 67.—The crop residues before raking with the side-delivery rake.

Fig. 68.—The crop residues after raking with the side-delivery rake.

when the residues from a considerable number of rows can be raked into one interspace.

A side-delivery rake should be more suitable than a rear-delivery rake for growers in the wetter areas of North Queensland who do not burn the crop residues after they have been raked into an interspace, either because the mass is too wet to burn or it is desired to conserve some organic matter. A further consideration is that crop residues can be raked on part of a field and ratooning proceeded with while cane is being harvested from the balance of the field.

With regard to the value of these residue rows from the point of view of soil erosion control it might be pointed out that in some cases, particularly on the steeper slopes, they have a tendency to increase, rather than decrease the erosion hazard. This is due to the accumulation of soil against the trash with consequent damming of water during heavy falls of rain. Instances have been noted in fields on steep slopes, where the sudden break through of this water carried trash and a good part of the top soil to the foot of the slope. Erosion control should always be done in accordance with accepted practices.

The Food Calorie Value of Sugar.

The following table illustrates the acreages of various agricultural products required to produce annually one million calories of the various foods. The million calorie figure is derived from the fact that a full-grown man requires just about that amount of food in a year.

Food.	Acres of Land.	Ratio to Acreage of Sugar.
Sugar	0·13	..
Corn	0·32	2·5
Sweet potatoes	0·36	3
English potatoes	0·44	over 3
Rice	0·59	4·5
Soy bean	0·67	5
Beans	0·91	7
Whole wheat flour	0·90	7
Corn meal	0·90	7
Refined wheat flour	1·20	8
Pigs (pork and lard)	2·00	13
Whole milk	2·80	19
Eggs	7·00	46
Poultry	9·3	62
Steers (beef)	17·0	113

* From "Sugar: The Foundation of Life" by Robert C. Hockett, Scientific Director, Sugar Research Foundation, New York.

Leaf-Scald Disease in North Queensland.

By C. G. HUGHES and S. O. SKINNER.

For many years Queensland enjoyed the unenviable reputation of having a greater range of sugar-cane diseases than any other country. Diseases were then a serious hazard to successful cane growing and losses were so high in some years as to make cane farming a precarious occupation. Older farmers will recall, for instance, how gumming disease caused such losses in South Queensland that many people really thought that sugar cane should be confined to the north and the unfortunate southerners should turn to other crops. This picture has, of course, been altered in recent years; a combination of change in varieties and vigorous control measures in the southern part of the State has reduced losses to such an extent that at the present time on a district-wide basis losses are less than in the north. It must not be assumed that there has been no effective disease control in the northern mill areas, for the elimination of gumming disease from Mulgrave and Hambledon, and the eradication of downy mildew, were performed as efficiently in the north as in the south. However, a clean sweep has not been made of controllable disease in all districts in North Queensland and it would not be amiss to draw attention to the specific mill areas where diseases are still causing serious losses.

The diseases referred to are chiefly leaf scald and chlorotic streak, and since they have been controlled to a very large extent in some of the areas, e.g., Mulgrave, there does not appear to be any reason why a systematic application of known effective control measures would not have a similar beneficial effect in such areas as Mossman, Babinda, Mourilyan, South Johnstone and Tully. It is recognised that there are staff difficulties for disease control work by the Cane Pest and Disease Control Boards and many in the districts mentioned have made attempts at control to the limit of their capacity: the virtual control of gumming disease in Mossman is a case in point. In some areas the excellent work being done in the distribution and application of benzene hexachloride has occupied all the energies of the Board's staff. However, it must be admitted that losses due to diseases in the affected areas are of the order of several thousand tons of cane every year and may, in certain areas in some years, be tens of thousands.

It is not proposed to describe here the symptoms of diseases causing losses in the north; the enquiring farmer is, as always, directed to consult his local Bureau or Cane Pest and Disease Control Board officer whenever he suspects that

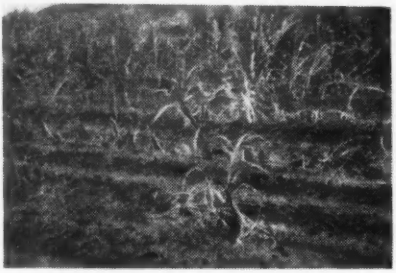

Fig. 69.—Poor strike as a result of using diseased plants of Clark's Seedling.

all is not well with his cane. Having had the disease identified the farmer will then be assisted as far as possible in the control of the disease. It is not normally practicable to control disease in a growing crop in North Queensland, largely because digging out diseased stools, or "roguing," as it is called, is not an effective control measure against the present important diseases of the north, i.e., leaf scald and chlorotic streak. Both diseases can, however, be controlled on a farm by growing resistant or relatively resistant varieties or by using plants only from a disease-free source.

Control by the use of resistant varieties can be quite effective and in Comus, Eros, Pindar and Q.50 the northern canegrower has the choice of several useful resistant varieties. It is possible, however,

that these canes may not suit a particular farm and it would be more profitable to grow other, more susceptible varieties. In that case it is absolutely essential to obtain plants from a healthy source. The Bureau or Board officer can help the farmer with advice here, but it is essential that the farmer co-operate fully by using clean seed always, for on diseased farms crops, even from healthy plants, will eventually become diseased and so be unsuitable for plants. With leaf-scald disease spread through the agency of the cane knife is important and all knives should be sterilized by fire, boiling water or a strong antiseptic such as phenol, after cutting a diseased block.

The photographs reproduced here show what can happen when leaf-scald diseased setts of susceptible varieties are planted. Figure 69 shows the poor stand obtained in a field of plant cane at El Arish, Tully area, through using diseased plants of Clark's Seedling. Many shoots failed to come through, others died after emergence. Replanting was not possible and the crop was grown to maturity. Figure 70 was taken from approximately the same position as the first photograph some 9-10 months later and shows clearly the big gaps in the cane rows. It does not show, however, that practically every stool standing was infected with leaf scald, and the grower

Fig. 71.—Dead cane at harvest time as the result of leaf-scald disease.

did not harvest that portion of the field for the mill. Instead he was put to the expense of cutting the crop and throwing it away. The field pictured in Figures 71 and 72 was also seen in the El Arish area and shows the high losses due to leaf scald in a ratoon crop of Q.44. The sticks left standing had been killed by the disease and in addition many others were left on the ground. Accurate figures are not available but it was estimated that at least half the tonnage of the crop had been lost through the disease and the numerous diseased sticks which went to the mill considerably reduced the average sugar content. The disease was so well established in this block that further ratooning would have been useless.

Fig. 70.—The resultant stand. See Fig. 69.

Fig. 72.—This dead cane means serious losses.

Fertilizers—Their Profitable or Wasteful Use.

By S. O. SKINNER.

As recently as the last ten to twenty years, many growers still had some doubts as to the real value of the so-termed "artificial" or inorganic fertilizer, and there was a certain amount of hesitancy in its use. Now the position has changed to such an extent that in numerous cases practices are being directed to ever increasing quantities, but without equal thought being given to the type most needed to meet the deficiencies of a particular soil.

Further, during frequent discussions with growers, it is surprising to find the number who apparently buy their fertilizer without reference to composition and cannot recall the type used even during the previous year. Such vague

Fig. 73.—The result of intelligent fertilizing. Cane on left was not fertilized.

In this respect one recent example only need be quoted. To a soil highly deficient in potash, applications of 4 cwt. per acre of meat works fertilizer had been applied over many years. Results were not satisfactory and applications were increased to 8 cwt. per acre. Cropping was still as poor as ever. When it is realised that meatworks contain no potash, the futility of, and loss occasioned by, this fertilizing programme can be readily appreciated. For this soil type, a mixture rich in potash at the original rate of 4 cwt. per acre, or even less, would have been much more profitable. Not only was the initial outlay of firstly the 4 cwt., and later the 8 cwt. per acre, of this otherwise valuable meatworks manure misdirected, but loss through poor cropping over the years must have been considerable.

usage must be associated with heavy losses. With rapidly increasing costs a closer study of one's fertilizing policy becomes more important than ever. On the other hand, it is pleasing to note that many growers now refer to a fertilizer by its plant food percentage content as shown on the label of every bag, e.g., 3 per cent. nitrogen, 15 per cent. phosphoric acid and 12 per cent. potash, rather than to just a name.

With the desire for heavier cropping, and the quite frequent very heavy use of fertilizer in an effort to achieve this, it appears that several factors are often

partly or fully overlooked in the economic use of manures. In the first place the quantity of plant foods applied is not the only factor contributing to heavy production. Others, many of which are beyond the control of the farmer, play a part, and determine the amount of fertilizer that can be absorbed by a crop. Moisture, for instance, is the greatest growth regulator of all. Thus as most of the cane in Queensland is grown without irrigation and as all areas are subject to dry spells, it should be appreciated that a cane crop cannot utilise fertilizer to the maximum over the full twelve months of the year. Further, when good weather is experienced, cane, as a plant, and unlike "Jack and the Bean Stalk," cannot oblige with an unlimited growth rate. Accordingly, there is a definite physiological limit to the quantity of fertilizer than can be utilised under the average conditions prevailing in a district.

Secondly, *type* of fertilizer is important since it must be remembered that a surplus of one plant food, say phosphoric acid, will not compensate for a deficiency in the soil of nitrogen or potash. It may be claimed by a grower that he has doubled the quantity of mixture per acre and by using a very high rate of application has appreciably increased his crop. This brings up an important point. It is quite possible that his soil may be seriously needing one particular food, for instance potash, and he has been applying a mixture containing only some 5 per cent. or so of this ingredient. By doubling his rate per acre he has simply given to his soil the required amount of potash. However, this could have been supplied more economically by a much smaller application of a mixture rich in this plant food. Such cases were very noticeable soon after the war, particularly on soils previously regarded as fair in potash, but which became more seriously depleted than expected by the growers, through the continued unavailability of this material.

The determination of the most economical quantity per acre, and type most needed by a soil, confronts a grower with a major problem. Furthermore, the wide range of mixtures on the market from which to choose, if anything, adds to his confusion. Unless a grower has had long experience and has made a close study of his soils, the choice of fertilizer and rate of application can be little better than a vague guess. The Bureau in its detailed study of soils to assist growers, has conducted over the last twenty years, hundreds of farm fertility trials on all major soil types. This work has provided much valuable information. In addition, the Bureau conducts a free soil testing service from which fertilizer recommendations are given. All growers are strongly recommended to avail themselves of these facilities.

Remember—more important than ever with present-day high costs—a pound saved is a pound gained. Fertilizer, correctly applied, is an integral part of sound farming; carelessly applied, it can be money wasted.

DESPATCH OF SUGAR CANE BY AIR.

Rigid control over the transfer of sugar cane by rail has always been exercised by the Bureau. The reason for this is to prevent the possibility of spread of disease from one district to another, and the railways refuse to accept cane for consignment unless accompanied by an official permit.

This restriction is now extended to air travel and the various airlines operating in Queensland have agreed not to accept sugar cane as air freight unless accompanied by a permit from a member of the Bureau staff.

Trials With New Legumes.

By G. BATES.

Green manure crops have long been recognized as an essential part of the business of cane growing, and one of the difficulties facing the growers in North Queensland is to find a variety that will stand up to wilt disease and the heavy rainfall experienced during the growing season.

Poona Pea, which at one time was widely used, is fast losing its popularity owing to its susceptibility to wilt, and therefore the Bureau has paid particular attention to the development of better varieties. With this end in view five species of legumes reputed to be mildew resistant were obtained from Costa Rica in August, 1949. These were planted in small plots on the Northern Sugar Experiment Station, in September, 1949, to obtain seed for larger plantings in December of the same year.

In December, experimental plots were set out to compare the performance of these imported legumes with that of Reeve's Selection and Cristaudo Pea, which have already given very satisfactory results in most of our sugar districts. Three other Queensland varieties Q.1568, Q.4313 and Q.1565 were also included in the trial. The following is a list of the varieties planted.

Costa Rica—Chinegra, Chinito, Garbancito, Blue Mildew Resistant and Azul Grande.

Queensland—Q.1568, Q.4313, Q.1565, Reeve's Selection (Q.1582) and Cristaudo Pea (also known as Ingham Pea).

The land was in satisfactory order at the time of sowing on 8th December following good rain. Further heavy rain fell in January and from then on the land was more or less waterlogged.

All the seed germinated well, but as far as subsequent results were concerned the imported varieties were most disappointing. They proved more susceptible to wilt and made poorer growth than the Queensland-bred legumes. Chinegra and Blue Mildew Resistant flowered within five weeks of planting, made poor growth and wilted badly. By the end of January both of these varieties had died out. Azul Grande made only fair growth compared with the standards. The other two importations, Chinito and Garbancito, made very fair growth but both showed more wilt than Cristaudo Pea or Reeve's Selection. Of the three Queensland-bred varieties, Q.1568, Q.4313 and Q.1565, the first mentioned made the best showing while the other two (Q.4313 and Q.1565) were only fair, compared with the standards, Cristaudo and Reeves. Q.1568, made strong early growth and was the outstanding pick of these three varieties. It resembled the Giant Cowpea in type of growth, in contrast to the Costa Rica importations which were similar to the ordinary Black Cowpea. It was still growing eight weeks after planting when the other varieties (excepting Cristaudo and Reeves) showed signs of flowering and cessation of growth. As a result of the trial this variety appeared to have possibilities and therefore a quantity of seed was collected and forwarded to four different Mareeba legume growers for propagation.

However, Q.1568 was planted again on the station in November, 1950, on red schist soil. Soil conditions were ideal at time of planting, and an excellent germination resulted. Rainfall for November and December was abnormal, 1,335 points being recorded in November and a further 1,839 points in December. Unfortunately, Q.1568 did not live up to its early promise and began to show signs of wilt soon after the heavy rain set in. At the end of December the plot was a mass of weeds. Reeve's Selection, growing under similar conditions, did not show nearly as much wilting and actually was still showing almost 100 per cent. cover.

It seems evident that the new varieties tried are of little value for North Queensland conditions, and that the best short-term legume for that region at present is either Reeve's Selection (Q.1582) or Cristaudo Pea.

The Importance of Foreign Varieties and Recent Importations into Queensland.

By R. W. MUNGOMERY.

Australia, unlike its near northern neighbour, New Guinea, possesses no indigenous varieties of sugar cane either noble or wild, so it was axiomatic that if a sugar industry were to be encouraged when the young colony was developing sugar canes would have to be introduced from other countries. This, in fact, is what did happen and the present vast sugar industry, which is regarded as one of the most efficient agricultural units in Australia, had its origin in canes that were imported from overseas.

Records of early introductions are most difficult to trace but there seems little doubt that Port Macquarie in New South Wales was one of the earliest recorded places where sugar cane was successfully grown. Thereafter as the industry expanded northwards into Queensland, importations of new and superior varieties were made from time to time. In this connection many of the older growers will recall such familiar sounding names as Bourbon, Striped Singapore and Rappoe which at one time or another constituted the principal varieties that were grown commercially. Since many private organizations were allowed to import canes, no close check was maintained against the introduction of the associated diseases and pests, and it was inevitable that in this process a large number of diseases and pests should also have been introduced. Consequently, as one variety went down to disease, a vigorous search was maintained for other varieties that might probably serve as suitable replacements, and in this way the whole tropical and sub-tropical world was combed for new varieties. Later, expeditions to New Guinea were successful in locating a number of canes that proved ideally suitable for growing in certain parts of Queensland and one of these, Badila, held pride of place for a number of years as the most important variety grown in this State.

Over the years, Mauritius and Java were freely drawn upon for new varieties whilst the West Indies also contributed their share. Growers will remember D.1135 and M.1900 Seedling which over a long period made a useful contribution to Queensland's annual crop; later on when these varieties succumbed to gumming disease they were superseded largely by P.O.J.2878 (the so-called Java wonder cane) and Co.290.

Cane breeding had been commenced in Queensland as early as 1888, and for 30 years or so subsequently this work was maintained in a modest way, but despite this the percentage of Queensland-bred varieties that were grown commercially was not large. A considerable expansion in cane-breeding activities took place in Queensland around the 1920's, but even so the tonnage of locally-bred canes remained fairly constant at about 20 per cent. until the early years of World War II. when a phenomenal expansion took place. By 1949 this figure had increased to almost 60 per cent. and this was due to the undoubted superiority and popularity of such canes as Q.28, Trojan, Q.50, Comus, etc., whilst varieties such as Pindar and Q.47 are destined to make their presence further felt. It is evident, therefore, that the industry has come to depend more and more on its own endeavours in fulfilling its requirements.

Because of the high standard attained over the past 20 years in the breeding and testing of new varieties, it is becoming increasingly difficult to evolve new canes outstandingly superior to the existing major varieties. Rather do we find that these new varieties outyield the standards by a small margin only, or only under a special set of conditions, and it seems likely that future avenues for progress will be found in exploiting these "special-purpose" varieties to the utmost. The opportunities here seem unbounded particularly since it is necessary to cater for the requirements of an industry covering 1,100 miles of coastline.

Raised as they are to suit a variety of soil and weather conditions in other parts of the world, it will be evident from the foregoing that many foreign varieties must continue to find a place in our economy. Indeed, the meteoric rise of the variety C.P.29/116 to provide over 12 per cent. of the Queensland crop during the past few years shows that opportunities still exist for exploiting foreign varieties to the utmost.

At the present time the Bureau of Sugar Experiment Stations is the only organization in Queensland authorized to import canes from overseas, and in order to guard against the introduction of foreign diseases and pests all introduced canes are given a suitable fungicidal and

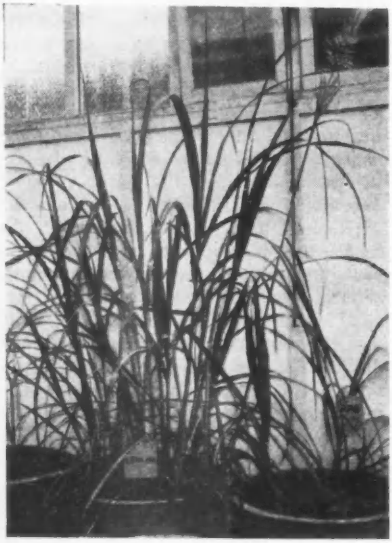

Fig. 74.—Imported canes in the Bureau quarantine house.

insecticidal treatment on arrival here, after which they are grown in an insect-proof quarantine house for a year. During this period of their growth they are regularly inspected, and if any suspicious symptoms develop the variety or varieties concerned are promptly dug up and burnt. The canes that successfully pass through the quarantine house are cut into setts and as a further precaution against the spread of pests and diseases, are hot-water treated before being sent to the Sugar Experiment Stations situated at Gordonvale, Ayr, Mackay, and Bundaberg.

At these stations they again come under close inspection while undergoing further propagation, and when sufficient stocks are available they are grown in plots in comparison with the local standard varieties. In this way a correct assessment is made of their general agricultural qualities and yield potentials. Should the performance of any such variety compare favourably with the standard varieties it may ultimately be approved for planting in some of the various mill areas of the State. This, however, is not done until it has been established that the variety will satisfactorily stand up to the diseases already present here, and this is accomplished by having the variety planted in various disease resistance trials. When the cane is first released from the quarantine house, a number of setts are retained in Brisbane to build up stocks for testing in these disease resistance trials and this work is now being carried out at an isolated plot at Moggill near Brisbane where all canes under test come under the watchful eyes of the pathologists.

Disease tests are made by either direct inoculation of diseased juice or sap into the setts or leaves, or by encouraging the disease to spread naturally by interplanting diseased and healthy material in close proximity, or by making growing conditions suitable for the colonisation of certain sap-sucking insects which are the normal agents responsible for the transmission of a number of such diseases. Varieties which do not contract the disease under these conditions of intense bombardment are classified as resistant and they are considered quite safe to be grown commercially. However, in the case of certain diseases, there has been, of late, some departure from the high standard of resistance formerly demanded, since some diseases have been eradicated within recent years from certain districts; consequently this automatically broadens the scope of our choice of new varieties.

Since the quarantine house was first put into commission in 1935 one hundred foreign varieties have been introduced

and planted there, and of this total no less than forty were planted during the past two years. This, in itself, is ample evidence that there has been no relaxing of our efforts to import from all parts of the world any canes that are considered highly desirable both from the breeding and commercial viewpoints. Modern air-freighting of the setts has greatly simplified the transfer of these canes from one country to another and recently we had the experience of planting six new varieties in our quarantine house exactly one week after their despatch from Washington D.C. These

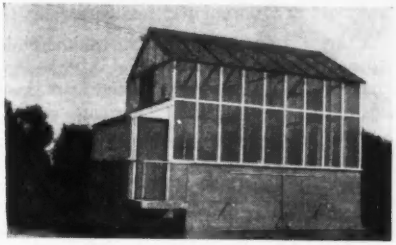

Fig. 75.—A view of the Quarantine House.

setts arrived in exceptionally good condition with the buds nicely developed and germination proceeded normally, whereas in previous years it sometimes happened that setts were received from the same source in a very weakened condition after a period of about three months, and considerable difficulty was experienced in getting some of the varieties established.

During the past two years we have received varieties from U.S.A., Barbados, Argentine, Hawaii, Fiji, Taiwan, Java, India, and also from the neighbouring State of New South Wales. Javan varieties are represented by P.O.J.3016 and P.O.J.2967. These canes occupied approximately 90 and 10 per cent. respectively of the total acreage under sugar cane in Java just prior to the Japanese occupation and these varieties had almost completely ousted the erstwhile-famous P.O.J.2878 there. P.O.J.3016 is a large, greyish-green cane, and gives an excellent germination with a very compact and erect habit of growth. Its stooling is exceptionally good and all shoots "come away" together and grow into a compact group.

Fig. 76.—C.P.29/116 in Louisiana.

The canes received from India are Co.475 and Co.617. Both are mid-season maturing varieties with a satisfactory sucrose content and they show resistance to red rot. The former appears to do better under conditions of good soil moisture, while the latter is a more general purpose cane and is reputed to exhibit some degree of resistance to drought and frost.

Of the six varieties received from South Africa, three, namely N.Co's 291, 339, and 349, have recently been released for planting in that country. They were all selected from the same batch of seedlings as N.Co.310 which is now proving such a popular variety in South Africa and they have the same parentage, Co.421 x Co.312. Although their sucrose quality is not as high as N.Co.310 they

Fig. 77.—C.P.33/183 eight-months crop in Louisiana. Compare Fig. 76 which shows an adjacent field of C.P.29/116 of the same age. C.P.36/183 is now in our quarantine house.

are capable of producing good tonnages and in many trials the differences in tons of sugar per acre were not significant. N.Co.349, which is probably the most promising of the six in South Africa, germinates readily and apparently adapts itself well to a wide variety of soil types. It is a straight cane which does not easily lodge, making it good for cutting and loading.

One of the Taiwan varieties, F.108, which was passed on to the four Experiment Stations this year, is a seedling of P.O.J.2725. It has been the leading variety in Taiwan since 1942, and in 1946 occupied 46 per cent. of the total sugar-cane area. It appears to form a solid regular stool with a good canopy of leaves. A newer variety, F.134, reputed to be earlier maturing than F.108, is now being grown in our quarantine house.

Barbados is represented by four varieties, the most important of which is B.37171. This cane is a general purpose one, and in 1948 occupied 90 per cent. of the harvested area of that island. Unfortunately, in the past, Barbados varieties have generally exhibited a pronounced tendency to lodge when grown here, and this is a distinct drawback.

In view of the success of C.P.29/116 in South Queensland, considerable interest has been aroused over several of the more important C.P. canes recently introduced from the United States of America. One of these, C.P.36/183, which comes from the same cross as C.P.29/116, was seen by Mr. Vallance during his visit to Louisiana in 1948 and he considered it sufficiently promising to be worthy of trial here in competition with C.P.29/116. Its growth and ratooning there were regarded as being good, whilst it was slightly earlier maturing, of higher quality and heavier yielding than C.P.29/116. In U.S.A. it was thought to be unsuitable for mechanical harvesting and for that reason was not widely propagated, but this factor alone was not considered to be of over-riding importance here, provided it showed promise in other directions. Another promising cane imported this year is C.P.36/111, a seedling recently released to the syrup farmers of Mississippi and Alabama as a substitute for or supplement to C.P.29/116, which is a favoured cane for those States. The main advantage of C.P.36/111 over C.P.29/116 is that it has a slightly higher sugar content.

Still another variety in our quarantine house is C.P. 44/101, which is regarded as being one of the best commercial canes so far released from Louisiana. This cane displays unusual vigour, produces heavy yields with good sugar and gives consistently good ratoon crops. It is resistant to red rot and root rot, and produces tall erect stalks and should prove entirely suitable for mechanical harvesting. The progress of all these commercial types will be watched with interest as they are tested over the next few years in different parts of Queensland.

Apart from the purely commercial aspect, there is another interesting development associated with the importation of a further two C.P. varieties and that is the value of these canes in the field of disease testing. These will be utilized in screening mosaic disease in different parts of the Queensland sugar belt to ascertain whether different strains are present. Some strains in other parts of the world are known to be very virulent while others are quite mild, and since these varieties react to different strains by the production of different mosaic patterns, it is expected that the use of these varieties in sorting out the local strain or strains will lead to a better understanding of what may be involved in our mosaic disease problem here, even though it may now be of little importance.

The opportunity for assembling suitable breeding canes has not been overlooked and at the present time four pots in the quarantine house are occupied by *robustum* seedlings from Hawaii. Arrangements have also been made for the utilization in our cane-breeding work of the Hawaiian commercial variety H.37/1933, which is now undergoing its requisite period of quarantine. In addition, the United States Department of Agriculture has made available a heavy-stooling *robustum* hybrid, U.S.49-7. These canes, containing a proportion of wild blood in their genetical make-up, will provide the plant-breeder with a number of important breeding lines which may prove of the utmost value in the future production of commercial canes for Queensland's requirements.

Q.28 and Q.50.

By NORMAN J. KING.

No doubt many canegrowers who have grown old in the industry pause occasionally to speculate on the relative values of old and new cane varieties. Memory tends to recall the good crops of years ago and to forget the below average ones, and many of the early cane farmers must have some feelings of regret when an old favourite gradually falls from prominence and joins the ranks of the discarded majority.

It is difficult to assess under the same conditions the performance of the older canes and the newer seedling varieties. The early types on which our industry was so successfully based had their prime of life on relatively new land and undoubtedly put up their best performances before the process of soil depletion and physical deterioration had advanced very far. The newer canes, on the other hand, begin their life on long-farmed soil and are, in fact, selected as seedlings because of their ability to perform well on cane land with fifty or more years of production behind it. If we attempt to compare say M.1900 S. with Q.50 in Mackay today we are comparing a modern variety possessing the capacity to thrive under poor soil conditions with an older cane which had its hey-day when the soils were nearer the virgin state. The environment has changed in the intervening years and perhaps the only true measure of their performance would be a comparative planting on virgin soil. It would be of interest to carry out such an experiment but it would not assist in recovering the soil environment in which M.1900 S. originally thrived.

The only valid yardstick of performance which we can use in present-day assessment is the average production per acre in a district. If over the years the unit production shows a well defined upward trend then we may accept with some degree of certainty that the newer varieties must be superior to the old—providing, of course, that no major change such as irrigation on a large scale, had affected production.

The breeding of Q.28 and Q.50 have made a marked difference to the production of Mackay district lands. Many field trials demonstrated the superiority of these hardy varieties over the older standards M.1900 S., E.K.28, Clark's Seedling, Co.290, Q.813, etc., and the growers were not slow to take advantage of the greater yielding power of the new productions. So rapid was the change over to the new canes that a veritable varietal revolution occurred in the short space of six years. Only on the richer scrub soils along the river and creeks have the older canes, Badila, P.O.J.2878, P.O.J.2725, etc., survived in quantity because on these soils Q.28 and Q.50 grow rankly and lodge easily.

It is interesting at this stage to attempt an assessment of the increased productivity conferred on Mackay lands by these two seedling varieties. Q.28 was first milled in 1943 and since that time 2,652,661 tons of it have been crushed in the Mackay-Proserpine area. Q.50 was a later variety and the first deliveries to the mill were in 1947. Despite its short life 689,204 tons have been crushed up to the end of the 1949 season. This aggregate of some 3,342,000 tons in seven years is a remarkable performance and one at which district farmers might well marvel.

So versatile has Q.50, in particular, proved itself to be on the various Mackay district soils that it is now commonly stated in that area that "there is no such thing as second-class land." At least we do know that, with Q.50, the grower may expect first-class crops on second-class soil.

Since the introduction of these two varieties yield per acre has increased throughout the area despite the variation in seasons experienced. If we examine the figures for the past seven years the upward trend can be observed and it is interesting to study this trend in conjunction with the tonnage of Q.28 and Q.50 produced.

Year.	Average Tons Cane per Acre.	Tonnage Q.28 plus Q.50 Crushed.	Percentage Q.28 and Q.50 in Total Crop.
1943	10·11	2,400	0·3
1944	15·74	111,000	10·0
1945	14·79	292,800	28·9
1946	13·91	438,617	41·4
1947	11·11	327,621	50·7
1948	20·67	961,463	57·6
1949	21·05	1,207,964	66·7

One of the outstanding features of Q.50 is its adaptability to a wide range of environments. It is almost axiomatic in sugar-cane agriculture that a variety suited to South Queensland conditions is not a good performer in the north and *vice versa*. There are many examples of this and, in fact, it is difficult to cite exceptions. Q.50, however, has performed remarkably well in all districts from Mossman to Nambour with the exception of the Herbert River, where it has not been tested against present-day standards. As in Mackay, where it is not suited to the richest soils, it is found in the far north that it performs best on the poorer soil types such as the schist soils and other types which are inclined to be dry. On river alluvial lands the vigour of Q.50 tends to promote rank growth. In Bundaberg Q.50 has not generally outyielded the standard C.P. 29/116 but it usually produces more sugar per acre by virtue of its higher sugar content.

Today Q.50 is an approved variety in 25 of the 32 mill areas of the State and may spread even further as more experience is gained. It is not claimed that this is the best cane for all conditions. In some areas in North Queensland where it is now approved further experience may cause its discard but it would appear to have a place on the poorer lands of most of the north.

On the debit side Q.50 possesses susceptibility to red-rot disease and under certain conditions this can result in serious losses. However, reasonably early harvesting will generally guard against heavy infection since the disease is worst at the end of the season following a dry spring.

Conjecture is rife as to how long this variety will last in the industry. We have become accustomed to the rapid coming and going of modern canes within a space of ten or twelve years. Little is understood of the reasons for this deterioration in yielding power, and we can only pin our faith in the cane breeders and trust that they will produce satisfactory substitutes as the necessity arises.

SUGAR BUREAU ANNIVERSARY BROCHURE.

This publication, which was issued in 1950 to mark the fiftieth anniversary of the establishment of the Bureau, is still available. Any cane growers or members of mill staffs can obtain a copy, free of charge, on making application to the Bureau. The booklet contains a considerable amount of industry information and is profusely illustrated.

Some Causes of Unsatisfactory Germinations.

By W. R. STERN.

From time to time complaints are received from growers concerning the unsatisfactory germination of their fields, and inspection by Bureau officers has usually shown that this could be due to any of a number of factors, or to the interaction of such factors.

Poor germination can usually be attributed to:—

(*a*) Faulty planting material.

(*b*) Excessive cover.

(*c*) Unsatisfactory tilth of the soil.

(*d*) Lack of compaction.

(*e*) Inadequate soil moisture.

(*f*) Incorrect placement of fertilizer.

(*g*) Conditions favourable to the development of disease or to the encouragement of pests.

Let us consider these individually in more detail.

(*a*) *Faulty planting material.*—The most obvious faults with planting material are damaged eyes. These could be damaged mechanically or could be the result of rodent, insect or bird damage. Growers are familiar with such damage and yet quite a number express surprise when such cane does not germinate.

Other unsuitable planting material is the basal buds of cane which has passed its peak of maturity, or cane which has been stood over from its usual growth period. Very often the lower nodes of such cane have produced roots, which represent a physiological development in the growth of the plant. This means that growth hormones which contribute to the germination of the eyes have been used for the development of roots and consequently the stimulus for such buds to germinate is not as great as that for cane which is free from nodal roots.

By the same token cane which has suckered heavily produces buds of doubtful germination capacity.

Diseased cane is obviously unsuited for planting.

(*b*) *Excessive or uneven cover.*—The significance of this is often not realised. It will obviously take a shoot longer to push through six inches of soil than through three inches, particularly when conditions of tilth and soil moisture are not favourable. With good soil moisture under cool conditions no more than three to four inches of cover should be necessary while with warmer temperatures even less cover should be adequate. Under dry conditions more cover may be required to retain available moisture and to prevent the soil around the sett from drying out too rapidly.

(*c*) *Lack of satisfactory tilth.*—Very often the soil at planting time is not in a satisfactory state of tilth. It may be too lumpy or too hard. Soil air is as important for good germination as is soil moisture. The tilth of the soil should be such as to allow an interchange of gases between the soil and the air, particularly in the vicinity of the sett.

(*d*) *Lack of compaction.*—Very often the balance between soil air and the soil moisture is unsatisfactory. The soil around the cane may be too loose and in this case the soil should be compacted by either a tractor tyre or a wheel behind the planter, or even by dragging something heavy such as a log or a disc in the planted furrow. This compacts the soil around the sett and maintains soil moisture.

(*e*) *Inadequate soil moisture.*—Where soil moisture is inadequate, germination is of necessity slow. In such cases soaking the plants before planting, compaction of the more friable types of soil and a little more cover to retain what little moisture is available should stimulate germination. Under irrigated conditions where soil moisture can be controlled this should not be a limiting factor.

(*f*) *Development of disease and encouragement of pests.*—Planting in cold weather or under cold and wet soil conditions will stimulate the development of pineapple disease. The development of this disease can be prevented by

dipping the setts in a suitable mercurial solution before planting. (Farm Bulletin No. 11, available on request). It must be remembered, however, that although this treatment in some way stimulates the germination of cane, besides preventing the development of pineapple disease, it is not a cure for the factors influencing faulty germinations as outlined in (*a*) to (*f*). Damaged eyes for example will not germinate if dipped, and care must be taken in the handling of cane when dipping.

Damage due to wireworms in some areas is encouraged in poorly drained heavy soils and can be prevented by the application of benzene hexachloride at the rate of 10 lb. of 20 per cent. dust incorporated in a fertilizer mixture.

The points to remember then in ensuring satisfactory germination are:—

(1) Select your planting material from vigorously growing disease-free cane.

(2) See that it is not damaged during planting operations.

(3) See that your soil is in a satisfactory state of tilth and that there is adequate moisture.

(4) Do not have too much cover.

(5) To prevent pineapple disease, dip in a suitable mercurial solution.

(6) To prevent wireworm damage apply 10 lb. of 20 per cent. benzene hexachloride with your fertilizer mixture.

The "Super" Cane.

The following extract is taken from an article entitled "Needed adjustments from the viewpoint of a farmer in the sugar cane area of Louisiana":

"Better varieties. By better varieties, I mean that variety that the producers, scientists and breeders have been seeking. One that will have a large barrel and high tonnage yield per acre. A variety that has good foliage and that effects a good cover over the row with erect growing characteristics. A variety that is early maturing and that has a high sugar yield per acre. A variety being resistant to all presently known sugar cane diseases. One with a considerably lower fibre content than the present commercial varieties. The above-mentioned qualities in one variety may be asking for too much, but I believe those men whose business it is to breed cane varieties will agree that some of the above qualities can be incorporated in a variety and we hope and pray that that day will not be too far away."

It is probable that a Queensland grower might add the following additional requirements: "The variety must be capable of striking well at any time of the year and of ratooning quickly and uniformly when cut at any part of the season. It should be easy to cultivate mechanically but at the same time provide a good ground cover. A self-stripping type would be desirable and the leaf sheath must be free of hairs. A soft-rinded cane, easy to cut, is essential, and the stalks should be uniform in length for mechanical harvesting."

The way of the plant breeder is hard and his goal apparently a high one.

N.J.K.

Testing Sugar-cane Varieties for Resistance to Downy Mildew Disease.

By C. G. HUGHES.

In the July, 1950, number of the Quarterly Bulletin an article was published on various general aspects of the testing of sugar-cane varieties for resistance to disease. It was indicated there that articles dealing more particularly with specific diseases would follow. This present article is the first of these and will deal with the testing of varieties for resistance to downy mildew disease.

This disease is not, at the moment, causing anything more than negligible direct losses in the cane crops of the State, but its potentialities for destruction of cane are so great and, as it happens, so many varieties being widely grown in Queensland are susceptible to the disease, that it must always be thought of as important. The testing of new varieties against it will certanly be a necessity for many years to come.

The wisdom of having a full knowledge of a disease, plus the reactions of the local varieties to it, was shown very emphatically when an outbreak of downy mildew occurred in the Hambledon area in the summer of 1949. Whence it came has never been found out but only a vigorous attack, inspired by the certain knowledge that the popular Trojan and Eros were susceptible to the disease, prevented it from flaring into a district-wide outbreak, possibly causing serious losses to many farmers before being brought under control.

Downy Mildew Disease.

It is not intended to describe the symptoms of this disease in detail but it can be recalled that downy mildew, as its name suggests, produces a down consisting of myriads of spores on the lower surface of the leaves (see Fig. 78) during the hot, still nights of the summer months. These spores are delicate and will not survive in sunlight or in a dry atmosphere, but they are easily wafted around by gentle night breezes and whenever they fall on a cane plant, are likely to set up a new point of infection. Once the disease occurs in a block of a susceptible variety, it only needs a season's neglect and a dangerous outbreak is well on the way.

The down itself may not cause much stunting, but the activities of the fungus within the stalk and the stool can easily lead to a large percentage of a field becoming a total loss. Stalks may be killed, strikes ruined and ratoons fail through the disease. Diseased fields giving a picture such as this have not been seen in Queensland for a good while but the reactions of some of the newer commercial varieties in resistance trials leaves no doubt that similar losses would occur if the disease became established in these canes.

Even though the disease has practically disappeared—the last stronghold of it in the Woongarra area of the Bundaberg district showed only a few stools last season—it does not mean that all danger is past because downy mildew is a disease which can affect corn and some of the other large grasses, and so it is possible that a reserve of disease exists outside the commercial cane crops, only awaiting an opportunity, as it were, to infect susceptible varieties of sugar cane. It is possible that this is what happened in Hambledon in 1949 but it is not proved, and the source of that outbreak, as mentioned above, still remains a mystery.

Downy Mildew Resistance Trials.

For many years all advanced seedlings from the Sugar Experiment Stations and the Colonial Sugar Refining Company, as well as promising importations from overseas, have been tested in Bureau downy mildew resistance trials, generally before their release as commercial varieties. Disease trials have been conducted in the Cairns, Ayr, Mackay and Bundaberg districts but, even though the trials were generally planted in localities at a safe distance from cane farms, as the disease was brought under control in a district the

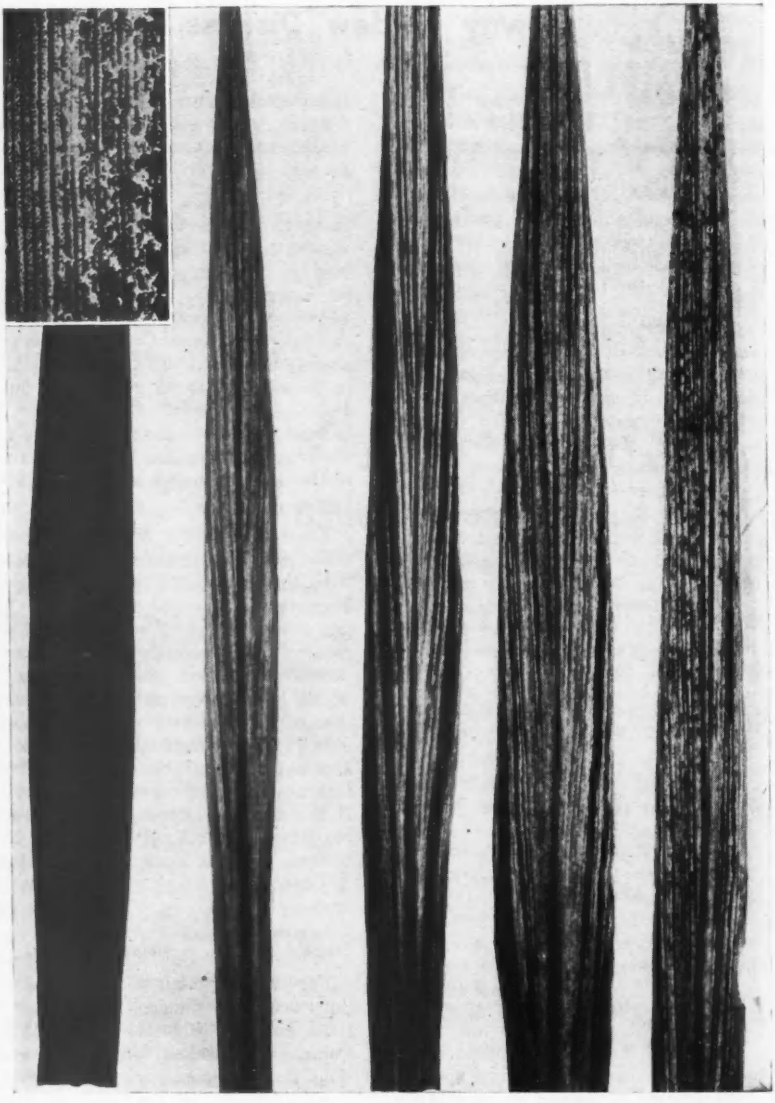

Fig. 78.—The characteristic leaf stripes caused by downy mildew. The inset shows (magnified) the down on the undersurface of the leaf.

disease trial was abandoned there and canes from that district sent elsewhere for trial. At the present time there is only one resistance trial per year. It is conducted in the Bundaberg district in an isolated place on the southern bank of the Elliott River. An indication of the isolation of the plot is given in Fig. 79 which shows a trial in process of being planted. However, since the disease is on the verge of extinction at Bundaberg, this is the last year a trial will be planted there. The next trial will be put in at the Pathology Plot on the Moggill Road near Brisbane, from which there could not possibly be any natural spread to commercial cane fields.

In planning a disease resistance trial careful consideration must be given both to the location of the trial and the planting arrangement within it, in relation to the known characteristics of the disease. For downy mildew the site chosen must have reasonable soil to give a fairly good growth of cane, but excess growth and lodged cane is undesirable because the trial could not then be adequately inspected. Irrigation is practically an essential to prevent loss of a trial through a dry spell. Because the disease spreads much more readily under humid conditions, it is obvious that the trial should be in a sheltered position and not in a spot exposed to every wind that blows.

The internal layout of the trial is important in making certain that sufficient disease develops and in guaranteeing that the results will be reasonably reliable. The disease is provided initially by diseased stools arising from diseased planting material and is spread by secondary infection in both cane and corn. At the end of each plotlet of a variety under test several diseased and healthy setts of a susceptible variety are planted. Both lots germinate but the disease is often so severe on the shoots from the diseased setts that they remain very stunted and frequently die, usually, however, not before they have infected the better grown shoots from the healthy setts planted at the same time. Spread of the disease from cane plant to cane plant is reasonably rapid but it is slow in comparison with the rate of spread among corn plants. It is the practice, therefore, when once the cane in the trial is well established to plant corn seedlings in the interspaces. These soon become diseased and before they die produce tremendous numbers of spores for the infection of the cane.

It can be understood that even in an area as small as a disease trial i.e. less than half an acre, it would be impossible to be certain that every part of the trial was exposed to the same amount of infection. The varieties under test are therefore each planted in three plotlets, well spaced through the trial area. Each plotlet usually consists of 20 setts in a single row and the regularity of infection in plotlets of varieties of known susceptibility is an indication of the reliability of the results from the trial.

The selection of the standard canes against which the new varieties are compared, is important from the point of view of the interpretation of results. The standards are varieties of known susceptibility or resistance to downy mildew and are, like the canes under test, planted in three plotlets of 20 setts each with the exception of P.O.J. 2878 which is usually put into six plotlets. Reference to Fig. 80, which is a plan of a typical downy mildew resistance trial, will show that four standard varieties have been included. Co. 290 is reasonably resistant, P.O.J. 2878 and Trojan susceptible, and Eros very susceptible. The Co. 290 is included in case the other more susceptible varieties should become 100 per cent. infected, when it would, in the

Fig. 79.—Planting a downy mildew trial near Bundaberg. The location is surrounded by forest.

absence of a resistant cane, be impossible to assess the susceptibility of many of the seedlings under test.

In a plant crop grown from healthy setts each diseased stick is regarded as a separate infection so the counts of disease are made and recorded on a stick basis. They are expressed as a percentage, and a figure of 20-30 per cent. for P.O.J. 2878 generally indicates that there is sufficient disease in the trial to make it a success.

The Resistance of Approved Varieties.

Information gained from outbreaks of downy mildew disease in commercial plantings as well as from resistance trials has been used in drawing up the list of the reactions of approved varieties to the disease. The varieties may be divided into five classes ranging from a group in which the disease is rarely seen to one whose members cannot be grown in the presence of the disease. The groups are detailed below:—

GROUP.	VARIETIES.
1. Highly resistant; may be grown in the presence of the disease without precautions.	1. Atlas, C.P.29/116, Clark's Seedling, Co.301, Comus, M.1900S., Orion, Q.42, S.J.2.
2. Resistant.	2. Badila, Cato, Korpi, Oramboo, Pindar, P.O.J.2725, Q.25, Q.28, Q.47, Q.813, S.J.4.
3. Intermediate; may be grown in the presence of the disease with suitable precautions.	3. Co.290, D.1135, E.K.28, H.Q.409, Mahona, Pompey, Q.10, Q.44, Q.45, Q.48, Q.49, Q.50, Q.51.
4. Susceptible; may only be grown in the presence of the disease when particular precautions are taken.	4. P.O.J.213, P.O.J.2714, P.O.J.2878, S.J.16, Trojan, Vesta.
5. Extremely susceptible; cannot be grown in the presence of the disease.	5. B.208, Eros.

DOWNY MILDEW RESISTANCE TRIAL No. XXVI

Planted: 15-16.9.49 *Location:* Elliott River, Bundaberg

Row 1	F.184	H.1	E.245	Co.290	G.273	Trojan	G.101	
" 2	F.160	H.84	B.174	Q.55	G.112	Eros	G.177	
" 3	41M.Q.105	H.70	G.262	G.105	F.304	H.3	P.O.J. 2878	
" 4	41M.Q.779	Q.50	R.O.J.2878	R.O.J.2727	G.270	G.104	G.208	
" 5	Co.270	Pindar	Co.301	H.17	F.343	G.176	H.18	
" 6	F.230	N.Co.310	G.362	E.119	F.335	F.186	G.323	
" 7	G.362	Co.301	F.160	H.70	41M.Q.779	Pindar	G.105	
" 8	Eros	B.174	F.335	41M.Q.105	H.18	Co.270	N.Co.301	
" 9	R.O.J.2878	E.119	F.186	Trojan	G.208	H.17	E.230	N.E.
" 10	G.323	G.177	H.1	F.343	R.O.J.2878	Co.290	Q.55	
" 11	G.273	G.176	F.184	G.101	G.104	Q.50	G.262	
" 12	G.270	G.112	F.304	H.84	H.3	E.245	P.O.J.2727	
" 13	G.262	G.105	E.245 (11)	N.Co.310	G.323	F.160 (14)	H.70	
" 14	Co.290	R.O.J.2727	Trojan	E.230	G.270	G.362	41M.Q.105	
" 15	G.208	R.O.J.2878	H.18	Pindar	G.112	H.1	41M.Q.779	
" 16	F.343	G.104	Q.55	Co.270	G.273	E.119 (14)	Co.301	
" 17	F.335	G.101	H.17	Q.50	Eros	P.O.J.2878	B.174	
" 18	F.304	F.186	H.3	G.176	G.177 (14)	F.184	H.84	

NOTES:—

Each plot 27' long with infection stations between varieties and at ends 6' 2" long. 15 setts per plot of Bundaberg and Mackay canes and E.245 except E.119 (14), F.160 (14), G.177 (14) and E.245 (11) in the third series. Merings canes 12 setts per plot. Bundaberg setts generally 2-eye all others 3-eye. Infection sites were each planted with 4 setts of diseased H.56 from the old downy mildew trial. 1-2 setts

Fig. 80.—Plan of a typical Bureau downy mildew resistance trial.

Mosaic Disease in South Queensland.

By R. W. MUNGOMERY.

Mosaic disease of sugar cane has always been regarded as one of the more serious diseases, which, if allowed to increase unchecked, is capable of causing serious curtailment in sugar production, and it is well known that in Louisiana, back in the 1920's, it threatened the very existence of the industry there. Though it never assumed quite the same ominous importance here in Queensland, it was for a number of years, widespread throughout most of the sugar areas and was most commonly seen in the southern districts. However, for a considerable time now in South Queensland, it has been relegated to a position of minor importance due to the extensive and systematic planting of P.O.J.2878, C.P.29/116 and other resistant varieties that fortunately, have remained the most popular and productive canes there over this long period. Indeed, it is problematical whether some of the newer growers in the industry are familiar with this disease since they have had so very few opportunities for becoming acquainted with it in the field.

The chief diagnostic characteristic is, as the name implies, the mottled or mosaic pattern of light and dark green areas which are to be found over the whole leaf blade. In some cases, especially in the dark-rinded varieties, a streaky pattern is also discernible on the rind of the upper internodes of the stick —the portion around which the leaf sheaths are still firmly attached—whilst in other cases where some varieties exhibit extreme sensitiveness to the disease, the internodes may show a definite waisted appearance, like a cotton reel, with the rind considerably cankered. Should any difficulty be experienced in determining the disease, assistance should be sought from an officer either of the Bureau of Sugar Experiment Stations or of the Cane Pest and Disease Control Board.

With the increased interest that has lately been centred on Q.50, Trojan and Pindar in South Queensland, instances have been noticed in which odd stools of

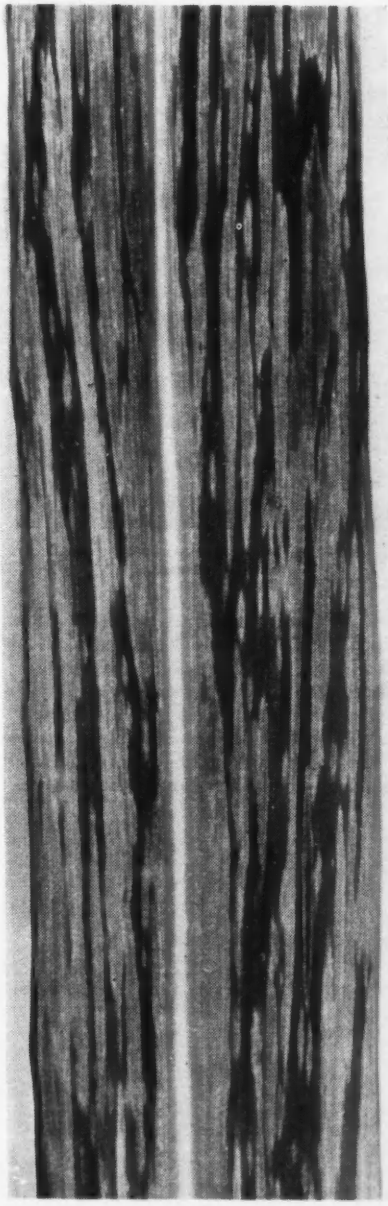

Fig. 81.—Typical markings on a mosaic diseased leaf.

Fig. 82.—The stunting sometimes caused by mosaic disease.

each of these three varieties have been infected with mosaic disease and it is in the increased plantings of these varieties wherein the danger from mosaic disease is likely to re-assert itself. Particularly has this tendency been noticeable on some of the river-bank farms where susceptible canes quickly acquire the disease. Under such conditions some growers have unwittingly planted diseased setts and increased the area of infection, for it seems almost superfluous to point out that a diseased sett produces a diseased stool. It may not be so apparent, however, just what losses may be debited against the disease, but in a recent trial in which an attempt was made to arrive at a reliable estimate, the loss due to mosaic disease in a plant crop of Q.42 was computed to be 23 per cent. In some varieties diseased stools may even fail to ratoon, thereby adding greatly to the overall losses sustained.

In addition to primary infection resulting from the planting of diseased setts, the disease is spread in a secondary manner per medium of a tiny insect, the corn aphis, which as well as occurring on corn, is also able to colonise on sorghum, Johnston grass and a number of other grasses. Hence by the agency of this insect, it is possible for a lightly diseased field to become heavily infected in the course of a few years and for the effects of the disease to become progressively worse with each planting unless stocks are drawn from clean sources. Growers should therefore take suitable precautions to keep these new varieties clean by obtaining their planting material from healthy sources, by roguing any diseased stools that may subsequently appear, and by maintaining their fields free from grasses and similar host plants of the corn aphis.

A. H. Tucker, Queensland Government Printer.